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* General studies, see also individual crops.

Plant Breeding Abstracts

Vol. XVII, No. 2

Part I. Empire Section

*STATISTICS 519

397. BALDWIN, E. M. 519.24

Table of percentage points of the t -distribution.

Biometrika 1946 : 33 : p. 362.

A table is given of the 5% and 1% significance levels of the t -distribution with n degrees of freedom, for all n from 1 to 30 and for all even n from 32 to 100. E. H. S.

398. CHAMBERS, E. G. 519.24

Statistical techniques in applied psychology.

Biometrika 1946 : 33 : 269-73.

The author points out the dangers of the practice, which he states is increasingly prevalent, of applying modern statistical techniques to data which may not satisfy the conditions on which these methods are based. This is particularly true when the data are not metrical in character but are personal assessments on some arbitrary scale or are in the form of rankings. A brief description is given, with references to the methods of rank correlation and paired comparisons which are designed for treating such data, and a numerical example is worked out. E. H. S.

399. JONES, A. E. 519.24

A useful method for the routine estimation of dispersion from large samples.

Biometrika 1946 : 33 : 274-82.

As a simple measure of dispersion in large samples, the author suggests the statistic S defined as the difference between the sum of the greatest r and the sum of the smallest r members of a sample containing n members. Formulae are given for the mean and variance of S for samples from any probability distribution satisfying very general conditions, and tables are provided of the exact values of its mean and standard error when the original data are normally distributed, for selected values of n and r . The standard deviation of the parent normal population may be estimated from a large sample by calculating S and referring to the tables. E. H. S.

400. PANSE, V. G. and AYACHIT, G. R. 519.24

Ten per cent probability of z and the variance ratio.

Indian J. Agric. Sci. 1944 : 14 : 244-47.

Tables are presented of z values and the corresponding values of the variance ratio for $P = 0.1$. These should prove of use to plant breeders when a less stringent test of significance is required than that at the 5% level.

401. THOMPSON, C. M. and MERRINGTON, M. 519.24

Tables for testing the homogeneity of a set of estimated variances.

Biometrika 1946 : 33 : 296-304.

It is frequently desired to test the homogeneity of a set of k estimates of variance, possibly with differing degrees of freedom, that is, to test the hypothesis that they are all estimates of the same population variance. This is usually performed by employing Bartlett's test which involves the calculation of a statistic M . The present paper provides tables of the 5% and 1% significance levels of M for all values of k from 3 to 15. A prefatory note describes the method of computation of the tables, and points out that care must be exercised, should any of the individual estimates of variance be based on less than 3 degrees of freedom. E. H. S.

* General studies, see also individual crops.

402. FINNEY, D. J. 519.24:631.421
Orthogonal partitions of the 6 x 6 Latin squares.
 Ann. Eugen. 1946 : 13 : 184-96.

An analysis has been made of the various possible orthogonal partitions of 6 x 6 Latin squares.

403. HUSSAIN, Q. M. 519.24:631.421
Symmetrical incomplete block designs with $\lambda = 2$, $k = 8$ or 9.
 Bull. Calcutta Math. Soc. 1945 : 37 : 115-23.

It is shown that there is no solution in the case of symmetrical incomplete block designs with $\lambda = 2$, when $k = 8$. A new solution is proposed when $k = 9$, and the conjugate of this design is shown to be non-isomorphic with the original.

404. KEMPTHORNE, O. 519.24:631.421
The analysis of a series of experiments by the use of punched cards.

Suppl. J. R. Statist. Soc. 1946 : 8 : 118-27.

A description is given of a method of analysing the results of a series of 2^n factorial experiments by means of Hollerith machines, and illustrated by reference to a series of 2^5 experiments on the manurial requirements of sugar beet. Details, including card design and timing, are given of the punching of the data, their conversion into the required units, and the computation and tabulation of the thirty-one treatment effects. Standard errors and some covariances were computed by hand. An indication is given of how the method could be applied to the results of 3^n factorial experiments. E. H. S.

405. MAHALANOBIS, P. C. 519.24:631.421
Use of small-size plots in sample surveys for crop yields.
 Nature, Lond. 1946 : 158 : 798-99.

A discussion is presented of the various ways in which sample size and shape of sample plot may prejudice accurate estimations of yield.

406. NAIR, K. R. 519.24:631.421
Statistical notes for agricultural workers. No. 27. Calculation of standard errors and tests of significance of different types of treatment comparisons in split-plot and strip arrangements of field experiments.
 Indian J. Agric. Sci. 1944 : 14 : 315-19.

The applicability of "Student's" t test and the Behrens and Fisher test to strip and split-plot arrangements is elucidated.

407. YATES, F. 519.24:631.421
A review of recent statistical developments in sampling and sampling surveys.
 J. R. Statist. Soc. 1946 : 109 : p. 12.

A comprehensive summary is given of the various methods of sampling in common use today, with an outline of the methods of determining the errors to which estimates made from the samples are subject. The language is largely non-mathematical, and examples are drawn from agriculture, forestry, and social survey work.

After a brief historical introduction, the author discusses in turn random sampling, sampling stratified for one or more factors, sub-sampling and balancing, the last being shown to be equivalent to an analysis of covariance. Some adjustments are suggested which may be useful when additional information is available about the population being sampled, as, for example, when the proportions of the population falling into the various strata are known. Other topics discussed are the special dangers of bias when estimating the ratio of two variates, the effect of a varying number of individuals in the sampling unit or a variable sampling fraction, and the advantages and dangers of systematic sampling. The paper ends with a critical survey of methods used in social survey work, and some remarks on the planning of sampling enquiries.

A full report is given of the discussion which followed the reading of the paper, along with the author's written replies to points raised in the discussion. E. H. S.

408. ANSARI, M. A. A. and
SANT, G. K. 519:24:631.421:633.11
**A study of soil heterogeneity in relation to size and shape of plots
in wheat field at Raya (Muttra district).**
Indian J. Agric. Sci. 1943 : 13 : 652-56.

The optimum size of plot in wheat trials has been determined as 270 ft², though this may be increased to 360 ft² if necessary. Long plots have no advantage over broader plots of the same area. Papadakis' method has been found useful for increasing the efficiency of the comparisons.

*BREEDING 575

409. 575:633(42.23)
**General review of research work with lists of papers published
during the year.**
33rd Rep. E. Malling Res. Sta. 1945 (1946) : 17-44.
Hatton, R. G. and I. Pomology. (pp. 17-24)
Rogers, W. S.

Apple

Most of the 2000 apple seedlings kept under observation fruited in 1945, many of them for the first time; selection was carried out.

A seedling from the cross McIntosh Red x Worcester Pearmain has been distributed to growers under the name Tydesman's Early Worcester (cf. Abst. 517).

A large number of apples having Northern Spy as one parent are now coming into bearing on stock M. IX; these are known to be very highly resistant to woolly aphid attack. Several varieties of commercial promise have been selected from this material.

Observations on the flowering season of new seedlings in relation to frost injury have been maintained with a view to the selection of late flowering varieties for commercial use. The breeding of late flowering apples with good quality is to be resumed.

Investigations on the inheritance of many characters have been continued, according to opportunity.

Seedlings have shown differences in their reaction to mineral deficiencies.

Various rootstock trials are reported.

Pear

Several hundred seedlings from crosses between commercial varieties gave their first real crop in 1945; promising seedlings have been selected for further trial.

Walnut

Useful data on varietal performance have been obtained.

Raspberry

For the fourth succeeding year, Seedling "L" cropped more heavily than any of the other eight varieties under test; Norfolk Giant, Seedling "H" and Seedling "F" were the next highest yielding varieties. These four varieties have so far proved to be more cane blight resistant than the other varieties included in the trial.

A new seedling has been distributed under the name Malling Promise (cf. Abst. 531).

New seedlings from crossed and selfed seeds have been planted out.

Black Currant

Cropping trials of promising new seedlings have been continued. New varieties have been sent to the National Fruit Trials.

Strawberry

Trials of virus free and virus tolerant varieties were continued.

Seedlings from crosses involving Royal Sovereign, Sir J. Paxton, Pillnitz and Huxley are being planted out for trial. Of the nine families tested in replicated trials, three have shown promise in their first full cropping year; virus tested clones of these are being raised.

Hoblyn, T. N. II. *Statistics and records.* (pp. 25-26).

* General studies, see also individual crops.

Hops

An investigation of the variation in the P.V. of small samples of hops was reported.

Fruit Trees

Sampling and variation studies were undertaken to develop simpler, labour-saving methods of recording the total apple crop, fruit size, red colouring of the fruit and the incidence of red spider.

The method of reducing experimental error by correcting the values obtained for each plot of trees according to the performance of its neighbours was not found to be useful under conditions at the East Malling Station; more satisfactory results were obtained by using the records of the previous history of individual trees.

The technique of recording vigour in fruit trees has been studied.

The general problem of the design of field experiments on fruit trees has received attention.

Harris, R. V. V. *Plant pathology*. (pp. 32-35).

Raspberry

Grafting tests of the reaction of new seedling varieties to mosaic are reported.

Investigations in Scotland on the raspberry viruses were continued.

Strawberry

Seedlings and commercial varieties were tested for tolerance to yellow-edge.

Beard, F. H. VIII. *Hops. A.—Varieties and cultivation trials*. (p. 41).

Trials of early and late Goldings hops are reported.

Approximately 88 new varieties, developed at Wye, were studied for their yielding capacity. A number of these varieties were subjected to brewing tests. Data on the susceptibility of the new varieties to *Sphaerotheca Humuli* were obtained (cf. Abst. 508).

Keyworth, W. G. VIII. *Hops. B.—Diseases of hops*. (pp. 41-42).

Tests of the Wye seedling varieties for resistance to *Verticillium* wilt, nettlehead and mosaic were carried out.

410. BLACK, W.
 DARLINGTON, C.D.,
 HUDSON, P. S. and
 JENKIN, T. J.

575:633(43)

Plant breeding.

British Intelligence Objectives Sub-Committee, London 1946: Final
Rep. No. 502. Item No. 22. Trip No. 966: Pp. 56. (Mimeographed).

The report is presented of visits in 1945 to a number of research institutes in Germany.

Wheat

Crosses between *Triticum vulgare* and *T. Spelta* are under investigation at St. Johann, Reutlingen, with a view to developing bread wheats of high quality, considerable winter hardiness and good yielding capacity, to replace the spelt wheat traditionally grown in the area.

Improved milling and baking quality is the chief aim of breeding work at Weihenstephan. Bavarian "land" varieties have been used to produce strains with high quality; to improve yield, these strains have been crossed with English Squarehead types and high-yielding northern German wheats. A relatively lax ear is preferred, since it is believed that a lax ear gives a more uniform grain sample. Lax-eared strains with short straw have been produced. At this Institute very small quantities of grain can be milled in the laboratory, and the flour tested through all the baking processes.

At Bonn a single variety, Siegerländer, has been produced and distributed. This is a long-strawed wheat with grain of high milling and baking quality, selected from a "land" variety. Siegerländer has been crossed with a Bavarian variety, and a new strain derived from the cross is under test with a view to general distribution.

A method of testing quality, as shown by the capacity of wheats for swelling in the dough, has been developed at the Göttingen Institute.

Wheat-rye hybrids

Wheat-rye hybrids have been investigated at Weihenstephan. The F_1 hybrids were highly sterile, but germinable seed was secured by using Rimpau's amphidiploid wheat-rye hybrid as male parent to fertilize the "double" eggs produced. The intermediate types have been lost during unattended propagation, and the material now being studied consists mainly of plants with somatic chromosome numbers of *c.*42 and *c.*56. Some of the 42-chromosome plants that are otherwise wheat-like have the characteristic downy stem of rye. The 56-chromosome forms have longer and larger ears than ordinary wheat, so that if they can be fixed and full fertility is attained, they may be expected to give higher yields; the baking quality of the grain has been found satisfactory.

Triticum-Agropyron hybrids

Both tetraploid and hexaploid wheats have been crossed with *Agropyron elongatum* and *A. intermedium* at the Kaiser Wilhelm Institute, Müncheberg. The F_1 hybrids were seen at Heitlingen. These had made vigorous growth and apparently bore many non-flowering shoots. Some of the material had been back-crossed to wheat. This line of work was not regarded as promising by the director of the institute.

Oats

Oats appear to be less cultivated than other cereals, and comparatively little breeding work has been carried out on the crop. A variety produced at Hohenheim is known as Hohenheimer Weiss; it is a spring-sown variety, reputed to be very early ripening. A white-grained variety said to be resistant to frit-fly has been developed at Weihenstephan. At Bonn a pure line variety, Rhein Gelb, has been selected from an old "land" variety.

Rye

In spite of the importance of rye as a bread cereal in Germany, little evidence was found that the breeding of rye is receiving serious attention. At Göttingen, the emphasis is not on rye for bread-making but as a crop for green fodder or silage, and a fodder strain suitable for upland conditions is being developed.

Maize

Maize is widely grown as a field crop, but breeding does not appear to have received much attention. No evidence was found that the possibilities of hybrid production had been investigated. New varieties have, however, been produced by selection.

Barley

Barley breeding, particularly for malting purposes, was begun at Weihenstephan in 1910. The breeding was based upon the old "land" varieties, especially those of Bavaria. From a cross between a selection of Danubian barley and a selection of Bavarian barley, the new variety Isaria was developed; this variety is probably the most widely grown variety in Germany. The highly mildew resistant Haisa variety, produced at Halle, is probably the second most widely grown barley. No recent barley breeding work seems to have been done at Weihenstephan.

The wild species *Hordeum spontaneum* has been used fairly extensively in crosses with cultivated barleys at the Kaiser Wilhelm Institute, Müncheberg, in view of its mildew resistance. New spring-sown and autumn-sown barleys have been developed from these crosses; some of the autumn-sown types are exceptionally frost resistant. It is pointed out that the main aim at this institute has been the production of barleys for fodder rather than for malting.

Forage grasses

Most of the institutes visited have produced "new" grass strains, but it would appear that the aim of each has been to produce only one strain of each species studied. When this is accomplished, it seems that the work is regarded as complete, except for the maintenance of the strain by continued re-selection at the original institute. These strains have been produced by selection only, according to the following procedure:—

Plant material collected from various sources is planted out together, and various characters are investigated, including, at least in some cases, the determination of protein content. On the basis of these observations, a number of "mother" plants are selected. All other

plants in the area are cut back, so that the seed produced is the result of selfing or cross-pollination between the selected plants. The "mother" plants are harvested individually, and each is represented in the next generation in the field by a number of its progeny plants. Selection is repeated, and the process is carried on indefinitely to maintain the strain. Exactly at what point seed is released for multiplication was not ascertained. When it is released it goes first to the sub-stations for trial and multiplication. After five to six years' tests the so-called "breeders" multiply the seed for general distribution if the strain is finally considered to be satisfactory, the first multiplication being undertaken by the sub-station.

Investigations on the following grasses are reported: Italian rye-grass, perennial rye-grass, tall oat grass, meadow fescue, cocksfoot, golden oat grass, hairy oat grass, timothy, smooth-stalked meadow grass, red fescue, reed canary grass, fiorin or red top, and awnless brome grass.

Forage legumes

The production of clover strains is essentially similar to that of the grass strains.

The Hohenheimer red clover is an early-flowering, double cut strain, mainly intended for a one-year ley. The Niederheiner strain produced at Bonn is widely used in the Rhineland Province; a red clover strain has also been produced at Weihenstephan.

A strain of white clover with very large leaves and vigorous growth has been developed at Kiel. It shows a general similarity to Aberystwyth S.100. The production of a strain with no leaf marking is being attempted.

Some derivatives of crosses between *Medicago sativa* and *M. falcata* have given promising results at Weihenstephan, where single plant selection for both forage and seed yield is in progress. Lucerne breeding has been begun at Weeze (?) bei Goch on the Lower Rhine. Hybridization between *M. media* and *M. lupulina* has been carried out at Müncheberg. An F_2 derivative of the *M. media* type appears to be fully self-fertile, setting seed without artificial tripping of the flower.

This material is now at Heitlingen.

A strain of sainfoin selected from "land" races has been produced at St Johann, Reutlingen. Work on sweet lupins is now being carried out at Ebstorf. A large number of lines are under study, including the blue, white and yellow types. The blue is the best for fodder purposes in northern Germany. Variation occurs in alkaloid content, tendency to pod-splitting, pod number per plant, and breaking-off of the pods. Forms with non-dehiscent pods have been secured, the Weike varieties of *Lupinus luteus* being the best variety of this type so far obtained. Certain calcium tolerant forms have also been developed.

Vicia villosa is given more attention than the ordinary vetch, possibly on account of its greater winter hardiness. Usually it is cultivated as a catch crop with rye. The Poppelsdorfer strain from Bonn is claimed to be less hairy than the common type.

The value of the native annual species, *Ononis alopecuroides*, as a green manure crop is under investigation at the Hohenheim Institute.

Other forage plants

Trials of *Phacelia tenacetifolia* as a catch crop for green fodder or silage are in progress at Kiel and Weihenstephan; the plant grows rapidly and it is highly drought resistant.

Swede

A yellow-fleshed swede for human consumption has been bred at the Hohenheim Plant Breeding Institute; it is not known whether this variety is resistant to finger-and-toe disease.

Potato

Intensive breeding work is in progress at Weihenstephan, the main aims of which are the production of varieties resistant to diseases and pests such as blight, viruses and Colorado beetle. Drought resistance is also receiving attention. The parental material used in this work includes various cultivated potatoes and species from Mexico and South America, e.g. *Solanum demissum*, *S. chacoense* and *S. andigenum*. In recent years, five varieties have been bred at the station, viz. Falke, Monika, Roswitha, Robusta and Tiger. The first four varieties named are described as resistant to the common strain of *Phytophthora*

infestans. The Polish variety Switez has been chiefly used in breeding for resistance to A, X and Y viruses with apparent success. The new Robusta variety is claimed to possess a high degree of resistance to leaf roll; it is also said to have 25% starch content.

The most widely grown variety in Germany is Ackersegen. This potato is not particularly good in quality but is a useful general purpose potato. It is pointed out that public taste favours high quality yellow-fleshed varieties. Large quantities of potatoes are also grown for industrial purposes, high yield of starch per acre being the main essential in such varieties.

Serological tests to determine the presence and intensity of viruses have been developed at Gliesmarode. These tests have the advantage of speed. A single test may be completed in 20 minutes, and tests for five different strains in one hour.

Investigations are in progress at Celle to produce varieties with true immunity to viruses A and X, and tolerance to leaf roll. The German variety Flava shows immunity to virus A. Wart disease trials and other tests are being carried out at the Reich Biological Institute for Agriculture, Berlin/Dahlem.

Part of the potato breeding investigations previously conducted at Müncheberg are now located at Ebstorf. The work is chiefly concerned with breeding for resistance to blight, viruses, Colorado beetle and frost. The basic parental species are *S. demissum*, *S. chacoense*, *S. andigenum* and *S. acaule*.

Tobacco

Plants were observed at most centres, but no breeding work is reported.

Castor oil

Types with spineless fruits have been developed at Müncheberg.

Linseed

Little evidence of breeding investigations was obtained.

Sunflower

Early maturity, high yield of seed, low bush production, high oil content, and a drooping flower-head for protection against birds and rain are characters which have received attention in breeding work at Müncheberg. Russian and Rumanian types have been used in crossing. Selections have been obtained with an oil content of 32–33%, in comparison with the 28–29% oil content of ordinary sunflower seed. It has been found that pectin of a very high quality can be extracted from the flower-head receptacle, and that the stems yield cellulose suitable for paper-making and conversion into artificial silk.

Datura

D. stramonium has been grown at Hohenheim on a small scale in the field, to study the oil-producing properties of this species as a war-time measure. The seed is claimed to have an oil content of 30–33%. The seed is less poisonous than the leaves, and the alkaloid is extractable. Other species, particularly *D. Tatula*, are being studied at Heitlingen, chiefly as sources of alkaloids. Tetraploid forms of this species have been found to yield four times as much alkaloid as the corresponding diploids.

Taraxacum Kok-Saghyz

A yield of 100 kg. of raw rubber per hectare has been obtained by cultivating the Russian dandelion. Polyploid plants with higher rubber yield have been produced.

Strawberry

Interspecific hybrids are being studied at the Kaiser-Wilhelm Institute for Biology, Berlin/Dahlem. Particular interest is attached to crosses involving certain Chinese species.

Cabbage

A strain with long leaves and an elongated heart has been produced at Hohenheim; the strain is particularly well suited to field cultivation in this region.

Vegetable Marrow

A type of vegetable marrow has been developed at Göttingen, whose seed possesses 35–37% oil content. It is intended that the seed should be crushed and used as concentrated cattle food. The flesh is suitable for jam making, although if the fruit is used when ripe the keeping quality is unsatisfactory.

Peas and Beans

The runner bean is commonly grown, but except in some localities, the French bean has been very little cultivated. For this reason French beans from different sources have been tested under field conditions at Hohenheim. The South American types gave poor results. At Müncheberg both *Phaseolus vulgaris* and *P. multiflorus* have been used in an attempt to produce disease resistant types suitable for light soils and relatively insensitive to cold, damp weather. Interspecific hybrids between these two species have been secured. Use of *P. multiflorus* as female parent has given poor results. The F_1 hybrids are highly self-sterile, but they have been successfully crossed *inter se* and also back-crossed as female parents to the parent species. In the F_1 and later generations, dwarfs have appeared with abortive flowers. In backing-crossing, use has been made of Schreiber's Immuna, an anthracnose immune variety. Amphidiploid derivatives of *P. vulgaris* and *P. multiflorus* have been obtained by the use of colchicine. These forms have not produced satisfactory pods on account of the high degree of self-sterility.

According to the information obtained, the soya bean is not grown in Germany primarily for oil extraction but for use as a concentrate for animal and possibly human feeding. Breeding and selection are carried out at Müncheberg with the object of producing an early ripening strain giving high seed yields, rich in oil and protein. The Manchurian type is less sensitive to conditions of day length than other types. In the preliminary hybridization work, Manchurian, American and Canadian types have been used. Breeding at Weihestephan has proceeded along similar lines. The most promising variety for the more southern areas appears to be Weihestephan Black.

The Hohenheim purple-flowered field pea appears to be widely grown. Trials of field peas have also been carried out at Hohenheim. At St Johann, Reutlingen, pea breeding and selection are in progress. The method used is as follows:—

A considerable number of different crosses are made. The F_1 plants raised are allowed to self-pollinate, and all the seed derived from any one cross is pooled to produce the next generation. This process is repeated, without selection, until sufficient seed has been obtained to make plot trials possible. As the result of these trials the least satisfactory crosses are discarded and selection is made only from the best families.

411. ROBB, W. 575:633(48.5)

Notes on plant breeding in Sweden.

Scot. Agric. 1947 : 26 : 151–57.

An account is given of the plant breeding and seed testing work carried out at Swedish experimental stations.

412. 575:633(54)

Abridged Scientific Reports of the Imperial Agricultural Research Institute, New Delhi for the triennium ended 30th June, 1944
(1946) : Pp. 85.

Wheat

The survey work on samples of Indian wheats was continued.

Investigations on wild and cultivated wheat species and other graminaceous species are in progress, with a view to breeding for resistance to diseases and adverse conditions. The intergeneric hybrids, *Triticum vulgare* x *Secale cereale* and *T. vulgare* x *Aegilops caudata*, were studied cytogenetically. F_1 plants of *T. dicoccum* x *Ae. ventricosa*, *T. Timopheevi* x *T. monoccum* and *T. aegilopoides* x *T. dicoccum* are under observation; all three hybrids are completely sterile.

The mode of inheritance of branched ear and several other characters was examined in crosses of *T. Vavilovi* with *T. vulgare* and *T. sphaerococcum*.

Breeding for smut resistance and resistance to yellow, brown and black rusts is in progress. Drought resistance studies are reported; also work on photoperiodism and vernalization.

Maize

The possibilities of hybrid production are receiving attention.

Berseem

Experiments have shown that pollination by bees plays an important part in seed setting.

Potato

A number of hybrids from crosses between commercial varieties were tested for yield at hill stations in various provinces and states.

At the Potato and Wheat Breeding Sub-station, Simla, the collection of South and Central American species and hybrids was maintained, and further studied with regard to photoperiodic reaction and resistance to frost and disease. Crosses were made between *S. tuberosum* and other species. Breeding for late blight resistance was continued. By back-crossing *S. tuberosum* x *S. demissum* hybrids to cultivated varieties, particularly the Gloriosa variety received from Russia, resistant forms with good tuber shape and high yield have been secured; these selections are to be further tested. In breeding for virus resistance, intervarietal crossing has been carried out, resistant varieties such as Imperia and Craig's Defiance being used; promising progenies have been obtained. In work on frost resistance, crosses between *S. tuberosum* and *S. curtilobum* were studied.

Flax

Selection of strains resistant to *Melampsora Lini* from crosses between I.P. strains and resistant introduced types was continued. Tests of rust resistant selections again indicated the possibility of two or more physiological forms of the fungus being important.

Dual purpose strains from hybrids between linseed and flax varieties were studied at Delhi and Pusa.

A few seeds have been obtained from the cross *L. usitatissimum* ($2n = 30$) x *L. grandiflorum* ($2n = 16$); the latter species is rust resistant.

Sugar

The following investigations are reported from the Sugarcane Breeding Station, Coimbatore:—

About 40 crosses were effected with the purpose of developing early ripening seedlings with high sucrose content and superior quality. Among these the most important are: Co.281 x S.G. 63/32, Co.281 x Co.301, Co.349 x Co.313, Co.349 x Co.229, Co.508 x S.G. 63/32, Co.508 x G.2899, P.4626 x Co.453, P.3247 x Co.508 and Co.440 x P.O.J.2878. S.G.63/32 imparts to its progeny not only high sucrose quality but the capacity for maintaining high purity from October to January.

P.2607, Co.453 and Uba Marrot are particularly useful as parents for breeding canes for general purposes.

A large number of experimental crosses were also effected.

Two crosses involving sorghum, Co.349 x (Vallai x *Sorghum Durra*) and P.O.J. 2878 x *S. Durr*, have yielded fairly promising seedlings.

Crosses involving hybrids between sugar cane and bamboo are to be investigated. In addition to the bamboo seedling derivatives, Co.562, Co.563 and Co.564, distributed in 1942, the new seedling Co.606 has now been released.

A valuable parent for breeding for profuse tillering has been obtained in the fertile hybrid from the cross M.2819 (*S. officinarum* x *Narenga porphyrocoma* and Co.205 (*S. officinarum* x *S. spontaneum*).

Crosses have been carried out in an attempt to develop suitable chewing canes.

Determination of the chromosome numbers of *S. spontaneum* was continued. Forms with low numbers, i.e. $2n = 54$, are found in north or north-west India, while forms collected in a south-easterly direction show a steady increase in chromosome numbers.

Chromosome counts in seedlings of successive back-crosses with the wild parent *Sclerostachya* show a progressive reduction in number. This result therefore opens up the possibility of developing wild parents with desirable economic characters, which could be directly crossed with Co. canes.

Cytological studies of megasporogenesis in Co.421, carried out to investigate the origin of gametes with irregular chromosome numbers, showed that the main irregularity in meiosis was chromosome lagging.

The induction of flowering in non-flowering varieties and the hastening or delay of the reproductive phase in other sugarcanes has been achieved by suitable photoperiodic treatment. Information has also been obtained on the effect of manuring and irrigation upon the induction of flowering.

The problem of the storage and transport of pollen is receiving attention.

Notes are given on the new Coimbatore seedlings distributed during the period 1942-44. Varietal tests of resistance to red rot (*Collettrichum falcatum* Went.), wilt (*Cephalosporium Sacchari* Butler) and smut (*Ustilago Scitaminea* Syd.) are reported. Two main physiological races of red rot were identified.

Tobacco

In work on frost resistance, crosses were made between apparently resistant *Nicotiana* species and commercial varieties of *N. Tabacum*; conclusive results were not, however, obtained from observations on the F_1 because the cold weather occurred before the hybrids had made sufficient vegetative growth.

Species were tested for resistance to *Orobanche*. All the species investigated were susceptible, but differences in degree of susceptibility were noted.

Crosses made with the intention of combining high yield of cured leaf with high nicotine content were subjected to single plant selection.

An amphidiploid was obtained from the F_1 hybrid of *N. glauca* ($2n = 24$) x *N. plumbaginifolia* ($2n = 20$). Pollen meiosis was normal, but the amphidiploid was practically male sterile. A fair amount of capsules were, however, obtained by back-crossing to the parental species. Further investigations of male and female sterility are in progress.

Chillies

Colchicine-induced tetraploids were studied. No improvement in fertility was obtained by repeated selection. Improvement in fertility was obtained by repeated selection.

Eruca sativa

Colchicine-induced tetraploids were studied.

Brassica oil crops

A morphological and cytogenetical survey of a large number of types collected from all over India has been carried out, and a classification and key for identification have been completed. The origin of *B. juncea* ($2n = 36$) has been experimentally demonstrated; the species was artificially produced by crossing *B. campestris* ($2n = 20$) and *B. nigra* ($2n = 16$), and doubling the chromosome number of the sterile hybrid by colchicine.

The study of the inheritance of self-sterility in toria (*B. campestris*) was continued; the presence of two series of allelomorphic factors was tentatively established. Genetical studies on the mutant "apetalous" and the occurrence of apomixis are in progress.

Colchicine-induced tetraploids of *B. nigra*, *B. campestris* and *B. juncea* have been obtained, and studied in respect of growth, fertility and other economic characters.

Observations on *B. campestris* suggest that the variable setting of the tetraploids is due to segregation of genes for seed fertility, and that by selection it would be possible to secure tetraploids with full fertility.

The seeds of the tetraploids of the different species studied were heavier than those of the diploids, but their oil content was almost the same.

Sesame

Tetraploids of *S. orientale* and amphidiploids of the cross *S. orientale* ($2n = 36$) x *S. prostratum* ($2n = 32$) were produced by colchicine treatment. The tetraploids of *S. orientale* possessed a very high percentage of good pollen. The amphidiploids produced varying amounts of sterile pollen and showed variability in seed setting, in spite of their meiotic regularity. Use is to be made of the amphidiploid in breeding for drought and disease resistance.

Tomato

Some plants from the cross *Lycopersicon esculentum* x *L. pimpinellifolium* were very early and appeared to be more resistant to hot weather than ordinary commercial varieties. Improvement in fruit size was achieved by back-crossing to *L. esculentum*. The uniform and almost simultaneous ripening of the fruits in clusters is another objective of breeding.

Egg plant

Work on hybrids of *Solanum Melongena* ($2n = 24$) and *S. incanum* ($2n = 24$) indicates that it may be possible to breed varieties suitable for cultivation in both summer and winter.

The commercial possibilities of F_1 hybrids are under investigation. Pusa Purple, the F_1 hybrid of the cross Muktakeshi x Clustered White, was tested at several locations.

Gram

Colchicine-induced tetraploids were investigated; they were found to be as susceptible to wilt as the diploids.

Pigeon pea

Selection of *Fusarium* wilt resistant strains from the cross I.P. 24 x I.P. 51 was continued. Varietal tests of resistance to *Fusarium* are also reported. The following varieties were found to be resistant: I.P.80, I.P.41, C.38, C.15, A.126-4-1, D.16-17-2 pt. 12 and D.33-4-22.

413. VENKATRAMAN, T. S.

575:633(54)

Plant breeding—a solution for food scarcity.

Indian Fmg 1946 : 7 : 299-300.

The importance of improved varieties in increasing crop yields in India is discussed.

414.

575:633(54.3)

Progress report of the Institute of Plant Industry, Indore, Central India, for the year ending 31st May 1944 : Pp. 32.

Wheat

Varietal trials of *T. durum* and *T. vulgare* wheats are reported.

The comparative development of tillers and ears was studied in Narsingarh 111 (*T. turgidum*) and five *T. durum* varieties, viz. Dhar Selection, Rewa 42, Bansi 168, C.P.137-7 and Hyd. 557-10.

Experiments on samples of local *T. durum* wheat indicated that, with the exception of the wheats from Jhabua and Barwani, little improvement can be expected as the result of selection. Large scale selection of these two samples is to be carried out. The general need for hybridization is pointed out.

By means of a discriminant function, it has been shown that selection for high yield in *T. durum* wheat is possible on the basis of tiller number and grain weight, since these two characters are genetically correlated with yield.

Sorghum vulgare

New selections of Malvi Local and high yielding varieties from the Central Provinces were tested.

Cotton

Breeding work was carried out on both American (*G. hirsutum*) and desi (*G. arboreum* var. *neglectum* f. *bengalensis*) cottons.

In view of the wilt susceptibility of Malvi 9 and Malvi 9-20, a new resistant strain has been developed, known as Bhoj cotton (Dhar 33). The strain is as wilt resistant as Jarila, and equal to Malvi 9-20 in earliness, kapas yield, ginning out-turn and lint length.

Trials of Dhar 43, Malvi 9-20 x Jarila, Malvi 9-20 x Jarila, Malvi 9, Malvi 9-20 and Jarila on wilt free and wilt infected soil are reported.

Various progenies were also tested in a small bulk trial for wilt resistance; some of the progenies were equal to Jarila and Dhar 43 in wilt resistance. The F_2 generations of crosses and back-crosses between Jarila and Dhar 43 have been selected; the selections are to be tested in comparison with Jarila in a replicated progeny row trial. Further crosses between Jarila and Dhar 43 have also been carried out.

In work on American cotton, M.U.4 and Indore 1 were compared with four new progeny bulks. Progeny 41, from X-ray treated material, showed improvements in yield, ginning percentage and halo length.

Linseed

Local samples were tested against Indore Selection No. 6.

Groundnut

Akola 8-11 and Madras A.H.218 showed superiority over Akola 12-24; the trial is to be repeated.

Gram

A test of new Institute selections and introduced strains was carried out. Samples of local gram are being studied for their genetic variability.

Cajanus indicus

Samples of local tuer collected from various localities in Central India were tested against Indore Selection No. 5, and E.R. 38 from the Central Provinces; Indore Selection No. 5 showed a general superiority.

Indore No. 5 is being multiplied for distribution.

415.

575:633(54.3)

Progress report of the Institute of Plant Industry, Indore, Central India, for the year ending 31st May, 1945 : Pp. 30.

Wheat

In work on *T. durum*, a trial of promising family bulks from last year's trial, Bombay 224, P.B. 1, P.B. 3, E. 69, Rewa 42, Malvi Local, and early selections of Cambridge Rivet x Malvi was carried out. P.B. 1 shows promise of giving better results than the local wheats.

A varietal trial of *T. vulgare* and *T. durum* strains was also conducted under both barani and irrigated conditions. Information is given on their reaction to black and brown rust. Samples of *T. durum* wheats from Jhabua and Barwani have been selected for yield on the basis of tiller number and grain weight. The cross Cambridge Rivet x Malvi has been further selected for earliness and other characters.

Sorghum vulgare

Progeny bulks from last year's trial were tested in comparison with Indore 3 and 9; the experiment is to be repeated.

Cotton

The suitability of the new Dhar 43 cotton for different districts was investigated.

Trials on wilt free and wilt infected soil of the following cottons are reported: Dhar 43, Malvi 9, Malvi 9-20, Jarila, and bulk progenies of Malvi 9 x Jarila, V. 434 x Million Dollar, Malvi 9-20 x Jarila and *G. arboreum* x *G. anomalum*.

Selected F₂ progenies of Jarila and Dhar 43 and back-crosses of this hybrid to Jarila show superiority to Dhar 43 in yield and length, and equality with both parents in ginning out-turn.

Work is in progress on American cotton (*G. hirsutum*) to develop a strain as good as M.U. 4 in kapas yield and ginning percentage but with improved lint length. With this object in view, trials were carried out on M.U. 4, X 4463E, Buri 107, Indore 1, X-ray treated material, and one progeny of M.U. 4 x Buri and of Co. 920 x Buri. The M.U. 4 x Buri and Co. 920 x Buri progenies were outstanding in yield and ginning out-turn, and significantly better than M.U. 4; the progeny from Co.920 x Buri was inferior to Buri, but the M.U. 4 x Buri progeny was as satisfactory as Buri. Progeny 41 from X-ray treated material was again the most promising strain with regard to lint length.

Groundnut

Akola 8-11 again showed its superiority in yield of pods; the variety Akola 12-24 is to be replaced by Akola 8-11.

416.

575:633(54.8)

Report on the Administration of the Department of Agriculture, Travancore 1946 : Pp. 38.

Rice

Selections of several local varieties have been tested at the paddy breeding stations of Moncompu and Adoor. Strain No. 1229 of the local Kallada Samba variety and strain No. 1191 of the Chettiviruppu variety are to be multiplied for distribution.

Cotton

The introduced medium staple strains, M.A.II and Gadag I, have given successful results at the Dry Crops Farm, Aramboly. Seed of these cottons is to be distributed to cultivators in the south-eastern area of the state.

Sugar cane

Field trials and milling tests of 21 varieties are reported; P.O.J. 2725, P.O.J. 2878 and Co. 419 were found to be superior to the other varieties in tonnage and yield of jaggery.

417. HILL, A. G. 575:633(6)
Selection and improvement of food plants in relation to better nutrition.

E. Afr. Agric. J. 1946 : 12 : 125-27.

This article gives the substance of a paper read before the Royal Society's Empire Scientific Conference at Oxford in July 1946. Important objectives of plant breeding programmes in Africa are suggested.

- 418 575:633(67.61)
Annual Report of the Department of Agriculture, Uganda for the period 1st July, 1944-30th June, 1945 (1946) : Pt II: Pp. 60.

Sorghum

Confirmation was obtained of the resistance of T 27 to *Sphacelotheca Sorghi* and the susceptibility of L 33.

Rice

Mass selection has been begun at Mbale and Bosoga, for resistance to blast and for other desirable characters.

Cotton

In breeding for blackarm resistance in the Kawanda area, use is being made of the B_3 gene. Introduction of resistance to *Verticillium* wilt into the variety BP 50 is also in progress.

A transference of the tufted seed type to BP 52 is to be attempted, to discover whether the type can be developed without impairing ginning percentage. As a control the completely naked seed type is also being transferred.

The tendency of dormant axillary buds to develop monopodial branches at any node on the main stem, alongside the sympodial branches, and even at the nodes of the sympodial branches, has been observed in the red type of plant occurring in Uganda; the gene responsible for this red type has been identified by Hutchinson as R_1 . This character, it is pointed out, can compensate for the injury due to blackarm and *Lygus* attack by providing a secondary plant structure.

Varietal trials and spinning tests are reported.

Investigations on plot technique are being carried out.

The following investigations are reported from the Serere area:—

A large number of selected strains representing 33 varieties were tested for blackarm resistance.

Progenies from blackarm resistant F_2 selections of the cross between BP 52 and N 17 showed marked resistance, and no further selection was necessary, indicating that selection for homozygous and heterozygous resistant plants in the F_2 had been effective.

Varietal trials and spinning tests are reported.

The incidence of cross-pollination between plots separated by various distances was investigated. In determining the extent of cross-pollination use was made of the fact that the leaves of the hybrid between the okra leaf type and the normal type are intermediate in form and thus readily distinguishable from the parental forms.

Cassava

A trial of mosaic resistant varieties is reported.

Tobacco

Varieties have been under test for leaf yield and nicotine content. The Brasilia and Olson varieties of *N. rustica* received from the United States have so far shown the most satisfactory combination of high leaf yield and high nicotine content.

Coffee

Self-pollination of *Coffea robusta* in some cases has given a higher percentage fruit set than is usually reported from other countries. Promising trees have been obtained from self-pollinated selections, but further self-pollination was prevented by lack of assistance.

In the observation plots of *C. arabica* varieties at Kyembogo and Kachwekano, Kent's Arabica appears to be the most promising variety, as it has been at Kawanda and Bugishu. Abyssinian 1/11, and green tipped type, has exhibited resistance to exposure.

Cinchona

Selections are under observation.

419. 575:633(68.3)
**Annual Report of the Livestock and Agricultural Department,
Swaziland, 1945 : Pp. 38. (Mimeographed).**

Maize

Selection of Hickory King, of promising strains of American white flint maize, suitable for dry areas or late planting, and of the "streak" resistant hybrid obtained from Barberton is in progress at Aird Farm. It is hoped to back-cross the "streak" resistant hybrid with Hickory King, to improve its root development and the strength of the stem.

Varietal trials were carried out at Croydon Sub-station.

Kaffir corn

Selection and breeding work is planned with the aim of producing strains combining desirable plant characteristics and beer-making qualities.

Cotton

A trial of strains obtained from Barberton was carried out at Croydon Sub-station.

420. 575:633(68.9)
**ARNOLD, H. C. Agricultural Experiment Station, Salisbury. Annual report of
experiments: season 1944-45.
Rhod. Agric. J. 1946 : 43 : 344-54.**

Maize

Selected strains of Hickory King are being inbred with a view to the production of hybrid maize. Top-crosses of the open-pollinated varieties used by the farmers with inbred strains developed at the Station have yielded 2% more than the open-pollinated varieties.

Groundnut

Varietal trials are reported.

Velvet bean

The object of selection is to develop strains which will yield as much fodder as Jubilack and also give improved seed yield.

Soya bean

Further testing of strains derived from crosses between Potchefstroom No. 184 and Hernon strains has been carried out. Some of the new strains yielded more heavily than Hernon No. 107, but high yield tends to be associated with long growing season.

421. 575:633(69.82)
**Annual Report of the Department of Agriculture, Mauritius 1945
(1946) : Pp. 34.**

Sugar cane

A brief summary is given of the sugar cane breeding programme (cf. Abst. 498).

Tobacco

Selection of Amarello and other varieties was carried out. Intervarietal hybridization was continued, and consisted mainly of crosses involving Amarello; Amarello has the desirable characters of high yielding capacity and comparative resistance to black shank; many hybrids between Amarello and Bonanza were obtained for the purpose of comparison with the parent varieties. Intravarietal crosses were also effected to determine whether the progeny would be more vigorous than the progeny from normal self-fertilized seed.

Tomato

Crosses have been made between common tomato varieties and the local cherry tomato, with a view to increasing bacterial wilt resistance.

422.

575:633(72.98)

Administration Report of the Director of Agriculture, Trinidad and Tobago, for the year 1944 (1945): Coun. Pap. No. 47 : Pp. 16.

Rice

Varieties are being studied for their salt tolerance.

Sugar

Varietal trials are in progress. In addition to B.34104, the canes B.37161 and B.37172 show promise of becoming standard varieties on certain soil types.

Cacao

Budded plants of trees from the Amazon Valley which appear to possess a high degree of resistance to witches' broom have now been established at the River Estate; resistance trials are to be carried out. Clones I.C.S.8 and I.C.S.1 have given outstanding results. At the age of six years they have yielded over 700 lbs dry cocoa. The clone I.C.S.1 has been consistently high yielding and shows medium resistance to witches' broom. Certain seedling selections from local material and introductions from South America continue to show marked resistance to witches' broom; these are to be further tested for resistance and yielding capacity at the Marper Estate.

423.

HALDANE, J. B. S.

575:581.02

The interaction of nature and nurture.

Ann. Eugen. 1946 : 13 : 197-205.

Let A and B represent two genetically different populations, and X and Y two different environments. Then, if the two genotypes are tested in each of the two environments with regard to a particular criterion, and assuming that the performance with regard to this criterion differs for all the four possible combinations, then there are six possible orders of performance as shown below, where A and X have been chosen to represent the best combination (1) and the remaining combinations have been numbered in order of decreasing performance with regard to the given criterion:—

Type 1a	X Y	Type 1b	X Y
A	1 2	A	1 3
B	3 4	B	2 4
Type 2	X Y		
A	1 4		
B	2 3		
Type 3	X Y		
A	1 2		
B	4 3		
Type 4a	X Y	Type 4b	X Y
A	1 3	A	1 4
B	4 2	B	3 2

Interactions of types 1a and 1b are very common. Type 2 is exemplified by domesticated plants and animals which are well adapted to a particular environment but at a disadvantage elsewhere. Type 3 is exemplified from *Drosophila* data and type 4 from the performance of potatoes under different photoperiods (cf. *Plant Breeding Abstracts*, Vol. XIV, p. 168), where different clones may each prove superior in turn when grown under different photoperiodic conditions.

The author proceeds to consider cases in which two or more of the four performances do not differ significantly from each other.

For the general case, where m is the number of genotypes compared, n the number of environments, and k the number of criteria, the number of possible reactions is $\frac{(mn!)^k}{m!n!k!}$.

The application of this form of analysis to breeding and eugenics is treated finally. The author suggests that too much attention has been paid to obtaining varieties giving an optimum performance under highly favourable conditions, and not enough to interactions of type 2 and 4.

424. HALDANE, J. B. S. 575.1(47)

Soviet Genetics.

Guardian 1946 : No. 5266 : p. 542.

In this note, the author deprecates the conclusions drawn by Earl Russell as to the state of genetics in the Soviet Union. Earl Russell had stated his opinions in a recent review of a publication by Hudson and Richens on Russian genetics (cf. *Plant Breeding Abstracts*, Vol. XVI, p. 365).

425. RICHENS, R. H. 575.1(47)

Soviet Genetics.

Guardian 1946 : No. 5268 : p. 563.

Touching upon several points recently raised by Haldane (cf. Abst. 424), the author indicates to what extent it is possible to come to definite conclusions regarding the present state of genetics in the Soviet Union.

426. 575.1:007

Dr C. D. Darlington, F.R.S.

Mon. Sci. News 1946 : No. 12 : p. 1.

An account is given of the genetical work of C.D. Darlington.

***GENETICS 575.1**

427. BEALE, G. H. 575.1:007(47)

Timiarezhev, founder of Soviet genetics.

Nature, Lond. 1947 : 159 : 51-53.

A short survey is given of the life and work of Timirjazev, based on a recent book by Cetlin. Special attention is paid to Timirjazev's genetical views and his dislike of Mendelism, which is believed to be less pronounced than recent Russian authors have maintained.

428. 575.1:061.3

Genetics since 1939.

Mon. Sci. News 1945 : No. 1 : 2-3.

Recent trends in genetical science, as shown by the work of the Genetics Conference held in London in 1945, are discussed.

429. MATHER, K. 575.1:577:578.08

The genetical requirements of bio-assays with higher organisms.

Analyst 1946 : 71 : 407-11.

The problems of obtaining genetical uniformity in the higher organisms used for bio-assay work are discussed.

430. 575.1:632.3:577:578.08

PONTECORVO, G.

575.1:632.4:577:578.08

The genetical aspects of bio-assays with micro-organisms.

Analyst 1946 : 71 : 411-13.

Genetical variability and specificity of biochemical response in bacteria and fungi are discussed in relation to bio-assay work.

431. SRINATH, K. V. 575.116.1

Mechanism of crossing-over.

Nature, Lond. 1946 : 158 : p. 840.

A mathematical analysis is presented of the torsional strains present in a two-strand rope in the form of a helix, after one strand is cut. It is concluded that the second strand is likely to break opposite to the cut in the first strand, a point of interest in view of Darlington's theory of crossing-over (cf. *Plant Breeding Abstracts*, Vol. VI, Abst. 319).

* General studies, see also individual crops.

432. McILWAIN, H. 575.17:577.15:632.3
The magnitude of microbial reactions involving vitamin-like compounds.
 Nature, Lond. 1946 : 158 : 898-902.

It is suggested that several metabolic processes in the bacteria involving vitamin-like substances may be catalysed by no more than one or a few enzyme molecules per bacterial cell. The implications of this conclusion are discussed with reference to the relationship between the genes and enzymes of the cell.

433. BILLINGHAM, R. E. and MEDAWAR, P. B. 575.182
The "cytogenetics" of black and white guinea pig skin.
 Nature, Lond. 1947 : 159 : 115-17.

It is known that black guinea pig epidermis has the power of blackening white epidermis when grafted on to it. The evidence suggests that this change, which is permanent and heritable, is brought about either by the diffusion of cytoplasmic self-producing bodies from the black to the white epidermis, or, less probably, by the action of a hormone inducing the formation of such a self-reproducing body in the affected cells.

434. RADHAKRISHNA RAO, C. 575.22:519.24
The problem of classification and distance between two populations.
 Nature, Lond. 1947 : 159 : 30-31.

The problem of specifying an individual as a member of one of many populations, and of classifying populations themselves, is treated, using Fisher's discriminant function and Mahalanobis' concept of generalized distance.

435. FÁBIÁN, G. and MATOLTSY, G. 575.243:581.04
Test of a cancerogenic substance in respect to the 'non-disjunction' frequency of the X-chromosome in *Drosophila*.
 Nature, Lond. 1946 : 158 : 911-12.

Benzpyrene, while not affecting the frequency of non-disjunction in *Drosophila*, appears to lower the normal mutation rate.

436. ABRAHAM, E. P., CALLOW, D. and GILLIVER, K. 575.243:632.3:581.04
Adaptation of *Staphylococcus aureus* to growth in the presence of certain antibiotics.
 Nature, Lond. 1946 : 158 : 818-21.

S. aureus strain H (N.C.T.C. No. 6571) gives rise to antibiotic-resistant colonies when grown in the presence either of an antibiotic isolated from *Bacillus subtilis* N.C.T.C. No. 7197, or in the presence of polystictin or helvolic acid. It is suggested that these resistant strains arise by a specific modification of the original *Staphylococcus* strain induced by the various antibiotics concerned. The appearance of the resistant strains could not be accounted for by assuming that natural selection was working on an initially heterogeneous population, neither could it be assumed that they arose through the continual production of "variants" independently of the presence of the antibiotics.

*CYTOLOGY 576.3

437. HOLTER, H. 576.31:581.192
Establishment of cytochemical techniques.
 Nature, Lond. 1946 : 158 : p. 917.

Referring to an earlier article by Danielli (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1480), the author points out that the method of stratifying the contents of cells by centrifuging is used for ascertaining the distribution of cell substances, not of cellular activities.

* General studies, see also individual crops.

438. DANIELLI, J. F. 576.31:581.192
Establishment of cytochemical techniques.
 Nature, Lond. 1946 : 158 : p. 917.

Agreement is expressed with Holter (cf. Abst. 437) that centrifuging cytological preparations may provide useful information when properly interpreted.

439. BRUMBERG, E. M. and LARIONOW, L. T. 576.312:581.192:535.61-31
Ultra-violet absorption in living and dead cells.
 Nature, Lond. 1946 : 158 : 663-64.

Evidence is produced to show that the absorption by nuclei of ultra-violet radiation reported by Caspersson only occurs when the cells have been killed by the incident ultra-violet radiation. The nuclei of live cells are believed to be transparent to ultra-violet radiation, though the nucleoli are moderately opaque.

*DISEASES AND INJURIES, BACTERIA, FUNGI 632

440. RAMACHANDRA RAO, T. N., SOUNDAR RAJAN, S. S. and SREENIVASAYA, M. 632.422.3:581.04:576.312
Influence of carcinogens on yeast.
 Curr. Sci. 1946 : 15 : 283-84.

The effect of fluorene, fluoranthene, retene and chrysene on the N.C.T.C. 3019 strain of industrial yeast was investigated. Large heavily stainable nuclear bodies were observed in cells treated with retene, fluoranthene and chrysene; cells treated with fluorene showed no such effect. In the case of chrysene, the treated organisms attained a size twice the normal. The alcohol production of the treated strains is now being investigated.

441. LINDEGREN, C. C. 632.422.3:581.192:576.35
Function of volutin (metaphosphate) in mitosis.
 Nature, Lond. 1947 : 159 : 63-64.

The role of volutin in the metabolism of yeast cells is elucidated. It appears to be prerequisite for chromosome division.

442. LEA, D. E. and SALAMAN, M. H. 632.8:537.5:575.1
Experiments on the inactivation of bacteriophage by radiations, and their bearing on the nature of bacteriophage.
 Proc. Roy. Soc. 1946 : 133 : Ser. B : 434-44.

Experiments with γ -rays, X-rays and α -rays have shown that, while a single ionization is sufficient to inactivate bacteriophages of various sizes, the locus of ionization is irrelevant in the smaller phages but must occur in a more restricted zone in the larger phages. It is suggested from these findings that smaller phages may be regarded as macromolecules while larger phages may be considered as unicellular organisms differentiated into genetic and non-genetic regions.

ECONOMIC PLANTS 633

443. HURWITZ, S. 633-1.524(56.9)
New field crops for Palestine. 1. Forage, pasturage, and green manure.
 Bull. Agric. Res. Sta. Rehovoth 1940 : No. 26 : Pp. 116.

Experiments on the adaptability of a number of introduced crops to conditions in Palestine are reported, including the results of varietal tests. The following crops were investigated: African millet (*Pennisetum glaucum*); buckwheat; Rhodes grass (*Chloris Gayana*), *Eragrostis Tef*, *Paspalum dilatatum*, *Sorghum sudanense* and other forage grasses, *Spergula arvensis*, *Vigna unguiculata*, soya bean, field pea, horse bean, *Lathyrus ochrus*, *Melilotus* sweet lupin, *Vicia sativa*, sunflower, Jerusalem artichoke, pumpkin, *Sesbania macrocarpa* and *Crotalaria juncea*.

* General studies, see also individual crops.

444. 633-1.531.12(71)
Annual Report of the Canadian Seed Growers' Association,
Ottawa 1945-1946 : Pp. 50.

In addition to the usual annual report of the Proceedings of the Canadian Seed Growers' Association, giving information on such matters as the additional varieties accepted for registration and seed growing regulations, the report for 1945-46 contains the reprint of an address by C. H. Goulden, Officer-in-Charge of the Dominion Laboratory of Cereal Breeding, Winnipeg, entitled "Status and Use of Foundation Stock", in which the problems that plant breeders have to consider in the production of foundation seed stocks are discussed.

CEREALS 633.1

445. 633.1:575(42.9)
633.2/3:575(42.9)
JENKIN, T. J.
The Welsh Plant Breeding Station.
Farming 1946 : 1 : 141-48.

Breeding work carried out at the Welsh Plant Breeding Station on cereals and forage plants is described.

446. 633.1:575(94.5)
Mallee Research Station experimental work and results.
J. Dep. Agric. Vict. 1946 : 44 : 409-16, 434-40.

An account is given of investigations on cereals at the Mallee Research Station. Breeding and varietal tests of wheat and oats have formed the chief work. The results of recent trials of standard varieties and new hybrid selections of wheat are summarized, and descriptive notes are included on the recommended varieties of wheat, oats and rye which have been grown in 1946 for the production of pure seed. Information is also given on the reaction of wheat varieties to flag smut (*Urocystis Tritici*).

447. 633.1:581.143.26.03
ELLERTON, S.
What is vernalisation?
Fmr's Wkly, Lond. 1946 : 24 : No. 2 : p. 33.

A brief account is given of the principles and practical results of vernalization of cereals, with reference to the results of experiments in Britain and the use of vernalization in breeding technique.

448. 633.1-2.452-1.521.6:578.08
CHEREWICK, W. J.
A method of establishing rust epidemics in experimental plots.
Sci. Agric. 1946 : 26 : 548-51.

A simple method of inducing epidemics of the cereal rusts is described, which should be valuable in selection and genetical work on resistance.

449. 633.1-2.452:576.16:631.521.6(71)
JOHNSON, T.,
PETURSON, B. and
CHEREWICK, W. J.
Physiologic races of cereal rust in Canada in 1945.
25th Rep. Canad. Pl. Dis. Surv. 1945 (1946) : 18-19. (Mimeographed).

A report is given of the 1945 survey on the distribution, in Canada, of physiological races of the following cereal rusts: *Puccinia graminis* var. *Tritici*, *P. triticum*, *P. graminis* var. *Avenae*, *P. coronata* var. *Avenae*, and *P. anomala*.

WHEAT 633.11

450. 633.11(42)
THOMPSON, E. G.
Spring wheat.
J. Minist. Agric. 1947 : 53 : 423-25.

Spring wheat varieties are discussed, and the behaviour of spring and autumn wheats is compared.

451. MALLIK, A. K.,
SATAKOPAN, V. and
GOPAL RAO, S. 633.11:519.271.3:631.421
A study on the estimation of the yield of wheat by sampling.
Indian J. Agric. Sci. 1945 : 15 : 219-25.

An analysis of variance for wheat has led to the conclusion (1) that sample plots laid across the rows are less variable than those laid along the rows, (2) that the optimum percentage sample to be taken from the total population is 16%, and (3) that samples three yards along the rows or four to five yards across the rows are most suitable.

452. ALLEN, G. 633.11:575(71)
633.13:575(71)
Redman wheat outyields Regent.
Canad. Grain J. 1946 : 2 : No. 4 : p. 15.

Breeding work at the Dominion Laboratory of Cereal Breeding, Canada, is briefly described. Mention is made of the following investigations. The RL 1692 oat has been produced, which is resistant to crown rust and smut. The rust resistant Stewart wheat (*T. durum*) has outyielded Carlton, and in spite of its inferior straw it may replace the latter variety. Attention is drawn to the high-yielding Redman wheat (cf. Abst. 17). This variety shows drought resistance, and in flour quality resembles Marquis; it may replace Regent in many districts. Resistance to the new rust strain 15b, sawfly resistant wheats with solid stems, awnless *T. durum* wheats and perennial winter wheats are also receiving attention in breeding work.

453. WENHOLZ, H. 633.11:575(94)
Farrer oration 1946.
J. Aust. Inst. Agric. Sci. 1946 : 12 : 88-92.

This paper is the report of an address delivered at the New South Wales Agricultural Bureau Conference in July, 1946. A historical survey of wheat breeding in Australia is presented. Emphasis is laid upon the important foundation work of William Farrer in wheat breeding; present-day problems of breeding in Australia are indicated.

454. WURFEL, D. A. 633.11:575(94)
Wheat varieties.
J. Dep. Agric. S. Aust. 1946 : 50 : 99-102.

An historical account is given of wheat breeding in Australia.

455. 633.11:581.13:581.45
633.491:581.13:581.45
633.63:581.13:581.45
WATSON, D. J.
Comparative physiological studies on the growth of field crops.
I. Variation in net assimilation rate and leaf area between
species and varieties, and within and between years.
Ann. Bot., Lond. 1947 : 11 : 40-76.

Small but significant intervarietal differences have been detected in the net assimilation rate of sugar beets and potatoes. No significant differences could, however, be demonstrated for wheat varieties.

All these crops, however, showed intervarietal differences in leaf area.

456. SEN, B.,
CHAKRAVARTI, S. C.,
PAL, B. P. and
MURTY, G. S. 633.11:581.143.26.03(54)
Vernalisation response of cultivated Indian wheat.
Curr. Sci. 1946 : 15 : 351-52.

The authors give information on experiments carried out by them on the vernalization of Indian wheats, referring critically to the generalizations reached by Kar (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1495).

457. ELLERTON, S. 633.11:581.46:581.142(42)

Harvests in peril.

Fmr's Wkly, Lond. 1946 : 25 : No. 10 : 32-33.

Information on the liability of British grown wheat varieties to sprout in the ear is reviewed, and a description is given of the results of sprouting tests on 49 varieties carried out by the author. Marked differences in varietal susceptibility to sprouting are reported, and the commercial significance of these differences is discussed.

458. 633.11-2.7-1.521.6:575(71)

Sawfly resistant wheat on way.

Canad. Grain J. 1946 : 2 : No. 4 : p. 16.

A note is given on wheat breeding for sawfly resistance. Several new varieties have given good experimental results; one of these varieties may replace the sawfly resistant variety Rescue (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1053). Present aims of wheat breeding in Canada are described as a combination of early maturity, rust resistance, high quality and satisfactory yielding capacity, and also the development of types resistant to drought and insect attack.

459. PLATT, A. W. 633.11-2.7-1.521.6:575(71)

Breeding wheats for sawfly resistance.

Canad. Geogr. J. 1946 : 23 : 138-41.

Wheat breeding in Canada for sawfly resistance is described.

MAIZE 633.15

460. HARLAND, S. C. 633.15:575.12

A new method of maize improvement.

Trop. Agriculture, Trin. 1946 : 23 : p. 130.

The author makes an addendum to a recent article on a new method of maize improvement (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 26). It deals with a reference to A. E. Blount's early experiments on controlled pollination in a variety of white maize, to be found in the Yearbook for 1936 of the United States Department of Agriculture, p. 466.

BARLEY 633.16

461. ARNASON, T. J.,
HARRINGTON, J. B. and
FRIESEN, H. A. 633.16:575.11.061.633:575.182

Inheritance of variegation in barley.

Canad. J. Res. 1946 : 24 : Sect. C : 145-57.

The inheritance of a striped variegation occurring in barley has been investigated in the selfed progeny of striped plants, and in crosses between the striped plants and commercial varieties. Two alternative hypothesis are suggested to interpret peculiarities observed in the inheritance of the variegated character: (1) two dominant genes for green plastids are present, one of which is epistatic to the other and shows a high mutation rate to white plastids; or (2) a single gene mutation conditions the variegated and albino phenotypes, in combination with plastid or maternal inheritance.

462. BISHOP, L. R. 633.16:581.142:581.6(42)

Third memorandum on barley germination.

J. Inst. Brew. 1946 : 52 : 273-82.

Germination tests of barley varieties including certain new varieties, indicate that the relative degree of dormancy have an important effect upon varietal malting quality, high germination capacity being associated with high quality. These results confirm those of previous experiments (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 43). Evidence was also obtained that higher nitrogen content is not associated with lower germination capacity.

463. MEREDITH, W. O. S. 633.16:581.6(71)
Malting quality of Canadian barleys: V. Summary of seven years tests on Montcalm, a new smooth awned variety.
 Sci. Agric. 1946 : 26 : 560-65.

A report is given of the results of seven years' malting tests on the O.A.C. 21 and Montcalm barleys. The Montcalm variety is a smooth-awned barley derived from the cross (Michigan 31604 x Common Six-Row) x Mandscheuri made in 1922. It is concluded that Montcalm compares very favourably with O.A.C. 21 in malting quality.

MILLETS AND SORGHUM 633.17

464. MANN, H. H. 633.17(56.9)
Millets in the Middle East.
 Emp. J. Exp. Agric. 1946 : 14 : 208-16.

An account is given of the millets, *Sorghum vulgare*, *Panicum miliaceum*, *P. miliare*, *Setaria italica* and *Echinochloa frumentacea*, which are cultivated in the Middle East.

RICE 633.18

465. HEDAYETULLAH, S.,
 SEN, S. and
 NAIR, K. R. 633.18:519.24:631.531
Statistical notes for agricultural workers. No. 26. Influence of dates of planting and spacings on some winter varieties of rice.
 Indian J. Agric. Sci. 1944 : 14 : 248-59.

A detailed statistical analysis has been made of the behaviour of the three rice varieties, Latisail, Indrasail and Tilakkachari, planted at various dates and at various spacings. It was found that each variety reacted similarly to the various combinations of planting date and spacing conditions.

466. SWARUP PARACER, C. and
 CHAND LUTHRA, J. 633.18-2.485-1.521.6(54)
Further studies on the stem-rot disease of rice caused by *Sclerotium oryzae* Catt. in the Punjab.
 Indian J. Agric. Sci. 1944 : 14 : 44-48.

Data are given on the reaction of 19 rice varieties to *Sclerotium Oryzae* Catt. The following varieties proved to be the most resistant: Basmati 370, Basmati 3, Mushkan 7, Mushkan 41 and Bara 62.

FORAGE GRASSES 633.2

467. JENKIN, T. J. 633.2/3:575(42)
The breeding of herbage plants in relation to grassland husbandry.
 J. Brit. Grassland Soc. 1946 : 1 : 126-33.

The work of producing improved strains of forage plants is discussed, with particular reference to the investigations conducted by the Welsh Plant Breeding Station.

468. HURCOMBE, R. 633.261:576.312.35:576.354.4
Chromosome studies in *Cynodon*.
 S. Afr. J. Sci. 1946 : 42 : 144-46.

The somatic chromosome number of the Bradley strain was found to be $2n = 18$. Meiosis during microsporogenesis was normal. The sterility of this species cannot therefore be due to abnormal chromosome number or meiosis. According to their shape, the homologous pairs of the somatic chromosome complement fall into three groups: group I consists of five pairs of kidney-shaped or V-shaped chromosomes; group II consists of one pair of long, thin, club-shaped chromosomes; while group III consists of three pairs of rod-shaped chromosomes.

Information is given on the results of different staining techniques. The cytological investigation of *Cynodon* is being continued.

469. CHANDRASEKARAN, S. N. and
SUNDARARAJ, D. D. 633.283-2.112-1.521.6(54)
A very promising drought resistant fodder grass for south India.
Madras Agric. J. 1946 : 34 : 21-24.

Panicum antidotale Reiz, introduced from Australia, shows marked resistance to drought and gives good fodder yields in southern India.

ROOTS AND TUBERS 633.4

470. EIG, A. 633.41:582(56.9)
A revision of the Chenopodiaceae of Palestine and neighbouring countries.
Palest. J. Bot. 1945 : 3 : 119-37.

A revised classification of the Chenopodiaceae of Palestine and neighbouring countries is presented.

471. WALLACE, J. O. 633.42(93.1)
Turnip and swede crop.
N.Z. J. Agric. 1946 : 73 : 215-23.

Descriptive notes are included on swede and turnip varieties of New Zealand.

472. 633.42:577.16(68)
633.491:577.16(68)
635.656:577.16(68)

BURGER, I. J.
Studies on the processing of vegetables. (a) Some problems of the industrial utilization of vegetables.

Sci. Bull. Dep. Agric. S. Afr. 1946 : No. 253 : 1-2.

RICHE, F. J. H. LE

Studies on the processing of vegetables. (b) Ascorbic acid (vitamin C) content of some pea, turnip and potato varieties.

Ibid. 1946 : No. 253 : 3-8.

In section (a) it is emphasized that plant breeders must consider not only the requirements of the farmer but also of industry.

Varietal differences in fresh turnips, potatoes and peas are reported in section (b). Information is also given on the effect of dehydrating and canning turnips, and of dehydrating peas and potatoes.

473. PLANK, J. E. VAN DER 633.491:581.143.056
Some climatic factors determining high yields of potatoes.
Part I. Temperature and length of growing-season.
Emp. J. Exp. Agric. 1946 : 14 : 217-23.

The temperature conditions and length of growing season required for the potato to produce high yields are discussed. It is pointed out that the long, cool growing season free from frost necessary for a good crop and yields from late maturing varieties, is characteristic of only two types of situation, viz. high altitudes in tropical or sub-tropical latitudes, as in the Andes, or in maritime climates at high latitudes, as in the island of Chiloe and in north-west Europe. Data on the performance of the potato in maritime and continental climates are examined, in relation to conditions of temperature and the length of growing period, and the disadvantage of the shorter growing season in the continental climate in respect of yield, as in North America, is emphasized. The author further discusses the possibilities of improving the yield of potatoes grown in continental climates at high latitudes, with particular reference to developing means of interspecific hybridization, resistance to cold or heat, in order to extend the growing season. The difficulties of breeding on these lines are analysed. It is suggested that the introduction of frost resistance might at the same time reduce the optimum temperature for tuber formation to a corresponding extent. The author finally expresses the view that frost resistance under conditions in the equatorial Andes is a very different matter from frost resistance at high latitudes in a continental climate.

474. HAWKES, J. G. and DRIVER, C. M. 633.491:581.143.26.035.1
633.491:582:001.4
Origin of the first European potatoes and their reaction to length of day.

Nature, Lond. 1946 : 158 : p. 713.

In reply to the note by van der Plank (cf. Abst. 475), the authors do not dispute that Andean potatoes vary considerably in yielding capacity even under short day illumination, though they emphasize that the short autumnal days of Great Britain cannot be taken as equivalent to the normal short days of South Africa.

With regard to the name *Solanum andigenum*, the authors indicate the dangers that attend precipitous nomenclatural innovations.

475. PLANK, J. E. VAN DER 633.491:581.143.26.035.1
633.491:582:001.4
Origin of the first European potatoes and their reaction to length of day.

Nature, Lond. 1946 : 158 : 712-13.

Yields ranging from very low to high are reported for thirteen Andean varieties of *Solanum tuberosum* from the Empire Potato Collection grown at Pretoria. The author concludes therefore that the Andean varieties are less highly bred than the European, and that their generally poor performance in Great Britain may be due more to inherent inferiority than to unfavourable photoperiodic conditions.

It is regretted that Hawkes and Driver regard the proposal to discard the name *S. andigenum* as premature (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1521).

476. BALD, J. G., NORRIS, D. O. and HELSON, G. A. H. 633.491-2.8-1.521.6(94)
Transmission of potato virus diseases. 5. Aphid populations, resistance, and tolerance of potato varieties to leaf roll.
Bull. Coun. Sci. Industr. Res. Aust. 1946 : No. 196 : Pp. 32. (Mimeographed).

Preference by the aphids *Myzus persicae* Sulz. and *Macrosiphum gei* Koch. for different potato varieties, differences in varietal susceptibility to leaf roll infection, and varietal differences in tolerance to infection are reported. The variety Bismark shows outstanding resistance and intolerance to leaf roll disease. The possibilities of breeding new varieties with an even greater degree of field resistance to leaf roll are briefly discussed.

477. HUTTON, E. M. 633.491-2.8-1.521.6:575.11
The relationship between necrosis and resistance to virus Y in the potato. 3. Interrelation with virus C.
J. Coun. Sci. Industr. Res. Aust. 1946 : 19 : 273-82.

The leaves of potato seedlings from 25 crosses were inoculated with virus C or virus Y. The seedlings were classified on the basis of the leaf reactions into the following groups: plants showing (1) mottle; (2) systemic necrosis, leaf drop, and leaf drop steak; and (3) lethal necrosis and localized necrosis. The observed reactions to virus C and virus Y closely corresponded, a result which supports the view that virus C is a strain of virus Y. The mode of inheritance of resistance to virus C and virus Y is discussed.

478. BALD, J. G. 633.491-2.8-1.521.6:575.12
Potato virus diseases in Australia.
Farming, Lond. 1947 : 1 : 182-85.

Reference is made to work in Australia on breeding potatoes resistant to virus diseases. By crossing two Australian varieties with Katahdin, resistant lines have been obtained.

479. RAMIAH, K.

633.51(54)

Description of cotton varieties.

Indian Cent. Cotton Cttee Pp. 28. (Undated).

Useful information on the various characteristics of the improved cotton varieties now under cultivation in India is given in tabular form. Maps showing the distribution of the varieties are also included.

480. LORD, E.

633.51(67.61)

A textile technologist in the cotton field—II.

Emp. Cott. Gr. Rev. 1946 : 23 : 163–71.

An account is given of a tour in Uganda; it includes reference to the varieties cultivated in the different regions (cf. also Abst. 39).

481.

633.51:575(54)

Twenty-fourth Annual Report of the Indian Central Cotton Committee 1945 : Pp. 139.

An account of genetical investigations carried out during the year 1944–5 at the Institute of Plant Industry, Indore, is published in a separate annual report (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 546). The work of the other research stations for the year ended 31 August, 1945, is summarized below:—

Bombay

Breeding for wilt resistance, high yield and increased fibre strength was continued at Broach, with the object of developing medium and long staple cottons to replace short staple types. The results are summarized of tests of selections 1–2, 1–6, 3–50, P.G.L. 7–29, and the synthetic strain Vijaya derived from 1–2 and 1–6, in comparison with Broach Local and B.D. 8, on both wilt free and wilt infected soil. F_2 and F_3 selections of crosses and back-crosses of 1027 A.L.F. with selections 1–2, 1–6 and 5–18 were studied; further selections of this material, with 38–42 ginning percentage and 21–23 mm. staple length, are to be investigated.

In the Jalgaon breeding scheme, selections 197–3, 403–5 and 670–4, derived from the cross Jarila x N.R.5, have shown superiority over Jarila in yield, ginning percentage and wilt resistance.

In breeding wilt resistant strains suitable for the Surat area, promising selections have been obtained from the following crosses: (8–1) x K.F., 8–1 x B.C. 1–6, 1027 A.L.F. x B.C. 1–6, and 22–3–2–8 x B.C. 1–6. Families derived from back-crosses of hybrids between American and Asiatic cottons to American varieties have been tested in comparison with 1027 A.L.F. and Co.2. F_2 synthetic tetraploids, obtained by crossing the hexaploid 28–1 with *G. armourianum* and back-crossing twice to cultivated American cotton, have been selected. Breeding work at Viramgam and Dholka aims at improving the yield, quality and earliness of Wagad cotton by selection, and hybridization with Surti-Broach strains, such as 1027 A.L.F. and B.D. 8, and with Iranian *Gossypium herbaceum* types.

In the Kaira district, work is in progress to obtain a superior type of cotton by selection or introduction to replace the Rozi cotton (*G. arboreum* var. *typicum*) now grown on the goradu soils.

Work on the Dharwar-American cottons at Gadag aims at the development of an early maturing type superior to Gadag 1 in yield, staple length, ginning percentage, and resistance to red leaf blight. As in previous years, the two strains 9766 and 4411 were tested against Gadag 1. The strains showed superiority over Gadag 1 in yield, ginning percentage, and staple length. In spinning capacity they were slightly inferior to Gadag 1; this is, however, attributed to the effect of an adverse season. Families derived from the cross Gadag 1 x Co. 2 were also tested against Gadag 1. Family 9–3 proved to be superior to Gadag 1 in yield, ginning percentage, staple length and resistance to red leaf; this family also matures earlier than Gadag 1. The trials are to be repeated. Improved introduced cottons also exhibit superiority over Gadag 1 in various respects.

The "small leaf" disease is under investigation at Poona.

Sind

At the Mirpurkhas and Oderolal stations, hybrids between long staple Upland cottons from world sources and the hardiest Upland cottons of Sind were selected. Among F_4 progenies, strains from the crosses (M.4 x Wilds) x M.4, Wilds x Sind Sudhar, D.T. Webber x M.4 and Wilds x M.4, maintained the yield and ginning percentage of M.4 and Sind Sudhar and also showed a promising increase in staple length.

Varieties were tested for jassid resistance.

Punjab

Large scale tests of new selections of 289F/43 and L.S.S. have been carried out. Selection 238F possesses 3% higher ginning percentage and superior technological qualities in comparison with the parent 289F/43; three selections of L.S.S., 265F, 318F and 320F, mature earlier than their parent and are reported to possess a longer staple.

In breeding for jassid resistance, Punjab-American varieties have been crossed with Cambodia strains from Madras, viz. 920, Co.3 and Co.4. In work on the improvement of desi cottons, new strains with a lint strength greater than the Punjab-American L.S.S. cotton have been derived from crosses between Jubilee and *G. anomalum*. In yield they nearly equal Mollisoni; in ginning out-turn they vary from 36 to 38%.

Work at the Multan sub-station has resulted in the production of three improved strains: the desi strain 119 Sanguinum, and the two American strains 124F and 199F. At the Jhang sub-station, three new strains of American cotton have been developed, viz. 244F, 268F and A.C. 71; these strains are superior to 4F in yield, staple length, ginning percentage and technological properties. The improved strains 231 Rosea, 258 Mollisoni and 216F have also been produced at the Hansi sub-station.

Several selections have been tested in the scheme for improving Punjab-American 289F/K.25. A.C. 84 and A.C. 85, derived from the cross between 289F/K.25 and 289F/43, have shown superiority over 289F/K.25 in yield of kapas and ginning out-turn; they also possess desirable technological qualities and marked jassid resistance. Reselections of 289F/K.25 and selections from the back-cross 289F/K.25 x (289F/K.25 x 289F/43) also show promise in several characters.

In work on the jassid resistance of commercial strains of the Punjab-American cottons, 289F/K.25 and Victory, have proved to be susceptible, while 199F, 4F, 289F/43 and L.S.S. appear to be resistant. Work on the nature of jassid resistance is reported.

Central Provinces and Berar

New strains are being tested against standard local cottons.

Madras

In the work of improving Mungari cotton, yield tests of hybrid progenies have been carried out; selections showing promise as regards earliness and yield have been obtained. F_2 selections mostly derived from the crosses K.1 x *G. anomalum*, K.1 x Rozi, K.1 x Burma C.19 and K.1 x Changfeng possess satisfactory staple length and ginning percentage. Breeding for resistance to stenosis is to be carried out.

Colour improvement of the Cocanadas variety is receiving attention.

United Provinces

Strains have been selected from a variety of material superior to the improved United Provinces cotton, C.520, in yield, ginning out-turn and spinning value. A few promising wilt resistant strains have also been isolated, which are to be further tested. In trials of American cottons, L.S.S. and 100F show promise.

Bengal

The possibility of introducing long staple cottons on the well-drained highland soils of Bengal has been investigated; Parbhani-American, Co.3 and Co.4 are reported to be promising for these soils.

Hyderabad

It is hoped to select an improved Gaorani strain, superior to Gaorani 6, from the material in hand. The isolation of a cotton with high ginning percentage from G.12F-2 and of an early maturing selection from G.4M-11 is to be attempted. Promising selections of Upland cotton have been obtained, and are to be further investigated.

The work of improving the cotton of the various districts of the Oomras tract has the following objectives: the production of (1) an early maturing strain of Gaorani 12F with a high ginning percentage; (2) an early maturing strain of Parbhani-American cotton, with a high ginning percentage; (3) a wilt resistant strain of G.16C by hybridization with New Million Dollar; and (4) a quickly maturing, drought and wilt resistant variety giving a high ginning percentage and capable of spinning 12-16s highest standard warp counts. The improvement of Kumpta cotton by selection of the local variety of Raichur is in progress; tests of new Kumpta strains are reported.

Baroda

Progress in the work of improving Mathio cotton is described. The S.31 selection is considered to be particularly promising. A Mathio selection and selections from the crosses $S_6 \times \text{Jarila}$ and $S_6 \times \text{Jarila}$ were tested in comparison with C.520; some of the material has been retained for further study.

Mysore

Trials are reported of Mysore-American varieties, including the new strains M.A.X. and M.A.XI. Tests of Egyptian and Sea Island were also carried out.

482. AFZAL, M. 633.51:575(54.5)
Research on cotton in the Punjab.
 Indian Fmg 1946 : 7 : 276-80.

Information is given on (1) the distribution of the desi cottons in the Punjab, (2) the new short stapled varieties obtained by pure line selection, which show improved yield and ginning out-turn, and (2) the work of developing new cottons with medium staple length. Experiments to increase the staple length of the desi cottons were begun in 1930. A large number of improved strains have been selected from crosses between the Mollisoni cotton of the Punjab and the medium-stapled Chinese Million Dollar variety; these strains are known as the Jubilee strains. The staple of the Jubilee cottons is being further improved by crossing with *Gossypium anomalum*.

483. LORD, E. 633.51:575(62)
The production and characteristics of the world's cotton crops.
Part 2. Egypt.
 Shirley Inst. Mem. 1946 : 20 : 21-65.

An historical account is given of the cultivation of cotton in Egypt. In section III notes are given on the origin and characteristics of all the Egyptain cotton varieties (*Gossypium barbadense*) cultivated on a commercial scale since 1860. Section IV describes the diseases and insect pests of Egyptian cotton; it includes references to breeding for resistance. Parts V and VI deal with the cotton breeding institutes and methods of seed selection, and with spinning qualities, respectively. Section VII is devoted to an account of the present-day main crop varieties, new varieties on trial, the varieties whose production is on the point of cessation, and extinct varieties. In the final section possible future developments of cotton in Egypt are discussed.

484. IYENGAR, N. K. 633.51:575.127.2:576.354.4
Cytological investigations on auto- and allo-tetraploid Asiatic cottons.
 Indian J. Agric. Sci. 1944 : 14 : 30-40.

Details are given of meiosis in the colchicine-induced autotetraploid of *G. herbaceum* var. *frutescens*. In addition, chromosome association was studied in the autotetraploids of *G. herbaceum* var. *frutescens* (1 A-Long boll), *G. arboreum* var. *typicum* f. *bengalensis* and *G. arboreum* var. *neglectum* f. *indica*, and in the allotetraploids of the cross *G. herbaceum* \times *G. arboreum*. In all the autotetraploids, the mean number of quadrivalents was found to be approximately 8; in the allotetraploids, the mean number of quadrivalents ranged between 6.08 to 7.27. In general the later meiotic stages were regular. The allotetraploids showed some degree of self-fertility. Most of the progeny of the allotetraploids had a chromosome number of $2n = 52$. The autotetraploids were pollen sterile, but hybrids were obtained

from crosses between the autotetraploid *G. herbaceum* (1 A-Long boll) and *G. hirsutum* (Co.2). The hybrid possessed a chromosome number of $2n = 52$ and was completely sterile. The genomic constitution of the hybrid was found to be AA AD; this result confirms Beasley's analysis of the same interspecific hybrid (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 225).

485. KHADILKAR, T. R. 633.51:575.242:575.11
A dwarf mutant in *Neglectum verum* cotton.
 Curr. Sci. 1946 : 15 : 278-79.

A dwarf mutant occurring in *Gossypium neglectum* var. *verum* is described. Most of the parts of the mutant are about half the normal size, though the height was about one-third of the normal. The mutant was female sterile, but when used as the pollen parent, normal fruits and seeds were produced.

The mutant plant was crossed with the pure strains N.R.5 and B.XXI. The data obtained indicated that the dwarf habit behaves as a recessive to normal and depends upon a single factor pair designated *D d*.

In the cross N.R. 5 x mutant, the yellow petals of the dwarf mutant were dominant over the white of N.R. 5, a single gene differences being responsible for petal colour. The gene pair conditioning petal colour has been designated *Y y*.

The segregations obtained from the cross B.XXI x dwarf mutant suggested that the absence of sinus lobes in B.XXI is a simple dominant over the presence of sinus lobes, dependent upon a single factor, designated *S*; or that an inhibitor, designated *I*, is present which suppresses the expression of the sinus lobe.

The points of resemblance between this dwarf mutant and the crinkled leaf mutants observe in *G. barbadense* and *G. hirsutum* are indicated.

486. NANDA, D. N. and 633.51:581.145.2:519.24
 AFZAL, M.
A statistical study of the boll formation in cotton.
 Indian J. Agric. Sci. 1945 : 15 : 116-19.

A mathematical analysis is presented of the relation between boll formation and time for the four varieties 4F, 289F, 289F/43 and 39 Mollisoni. The curves obtained are useful in estimating adaptability to local climatic conditions.

487. NANDA, D. N.,
 AFZAL, M. and
 PANSE, V. G. 633.51:581.162:519.24
A statistical study of flower production in cotton.
 Indian J. Agric. Sci. 1944 : 14 : 78-88.

The relation between flower production and time for the four Indian varieties 4F, 289F, 289F/43 and 39 Mollisoni can be expressed by a curve of the third order. The relative rate of flower production was higher in the indigenous variety 39 Mollisoni than in the other acclimatized forms. The relation between relative rate of growth in height and flower production was also investigated.

488. KNIGHT, R. L. 633.51-2.3-1.521.6:575.11
Breeding cotton resistant to blackarm disease (*Bact. malvacearum*) Part II: breeding methods.
 Emp. J. Exp. Agric. 1946 : 14 : 161-74.

The distribution of the genes B_1 , B_2 and B_3 for blackarm resistance in cotton and their value in breeding were surveyed in Part I of this paper (cf. Abst. 42). The present paper describes under the following heads the technique of breeding for resistance: the preparation of the inoculum and method of spraying; grading plants for resistance; selection for resistance in Upland cottons already carrying the factor B_2 ; the transference of B_2 to a fully susceptible strain, and the individual transference of all three genes, B_1 , B_2 and B_3 to a single strain; the addition of gene B_3 to a strain already carrying B_2 ; and the additive role of B_1 in breeding for resistance.

489. AFZAL, M.,
NATH NANDA, D. and
ABBAS, M. 633.51-2.7-1.521.6:519.271.3
Studies on the cotton jassid (*Empoasca devastans* Distant) in the Punjab. IV. A note on the statistical study of jassid population.
Indian J. Agric. Sci. 1943 : 13 : 634-38.

The jassid population was estimated by the methods of sweeping, counting and fumigation over a five-year period. Each of the three methods indicated the same order of varietal susceptibility; sweeping, the simplest and cheapest method, is therefore recommended in breeding work. Information is given on varietal resistance. The difficulties of using the method of the analysis of variance in studying the data obtained on the jassid populations are discussed.

490. AFZAL, M.,
RAJARAMAN, S. and
ABBAS, M. 633.51-2.7-1.521.6:581.6(54)
Studies on the cotton jassid (*Empoasca devastans* Distant) in the Punjab. III. Effect of jassid infestation on the development and fibre properties of the cotton plant.
Indian J. Agric. Sci. 1943 : 13 : 192-203.

Investigations are reported on the effect of jassid attack upon plant development and fibre properties in susceptible and resistant cotton varieties. In the susceptible varieties jassid attack had a marked effect upon both development and fibre properties. In the resistant varieties no significant deterioration was observed in any of the fibre characters studied, nor was plant development hindered.

491. AHMAD, N. 633.51.00.14(54)
Technological reports on standard Indian cottons, 1945.
Technol. Bull. Indian Cott. Comm. 1945 : Ser. A : No. 63 : Pp. 107.

The technological report for 1945 on standard Indian cottons follows the plan of previous years' reports (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 70).

The results of fibre, yarn and spinning tests on each of the 19 standard varieties are reported in detail. Tables are also given summarizing the results of analyses of the fibre properties of the standard cottons for the years 1926-45, and the results of spinning tests during the period 1935-45.

492. SEN, D. L. 633.51.00.14(54)
Technological reports on trade varieties of Indian cottons, 1945.
Technol. Bull. Indian Cott. Comm. 1945 : Ser. A : No. 64 : Pp. 96.

A detailed report is presented of the 1945 spinning tests on samples of 36 commercial varieties of Indian cotton, and three varieties of African cotton, A. R. Kampala, A. R. Busoga and A. R. Jinja.

493. GUBIN, A. F. 633.52:581.162.3(47)
Cross pollination of fibre flax.
Bee World 1945 : 26 : No. 4 : 30-31.

Increased seed yields have been obtained by using honey bees to effect cross-pollination within the Russian variety N 823-3.

494. WILSON, I. M. 633.52-2.484-1.521.6(42.9)
Observations on wilt disease of flax.
Trans. Brit. Mycol. Soc. 1946 : 29 : 221-31.

The three flax varieties La Plata, Redwing and Bison are all susceptible to attack by *Fusarium Lini* in Wales, although Redwing is less susceptible than La Plata and Bison less than Redwing.

495.

633.523:575(54)
633.523:581.47:575.11.061.1
633.523:581.44:575.11-181.12**Progress of technical schemes.**

Bull. Indian Cent. Jute Cttee 1946 : 9 : 249-50.

The following investigations on jute are briefly reported:—

The cluster habit of capsules belonging to some foreign types has been found to be a single recessive character. An attempt is being made to introduce this character into Indian jutes, to increase seed production per plant.

Branch length is determined by two factors, the short branch with no more than four internodes being recessive to the long branch with many internodes. One of these factors is linked with the gene for the clustered habit of the capsule.

Three strains developed by the Jute Agricultural Research Laboratories have outyielded the control, D 154, by 32-45% in tests at Gangasagar.

The multiple crossing programme was continued. Secondary selection at Dacca and all the sub-stations has been completed. Selfing of *Corchorus olitorius* is now almost complete.

496. SEN GUPTA, J. C. and
KUMAR SEN, N.

633.523:581.143.26.035.1(54)

On photoperiodic effect of jute plants.

Indian J. Agric. Sci. 1944 : 14 : 196-202.

Short day treatment of plants of *Corchorus capsularis* and *C. olitorius* resulted in early flowering and reduced vegetative growth. It is pointed out that use could be made of this short day photoperiodic response in breeding work and seed production.

497. DAS, G. M.

633 523-2.7-1.521.6(54)

**Studies on the jute stem-weevil *Apion corchori* Marshall. 1.
Bionomics and life history.**

Indian J. Agric. Sci. 1944 : 14 : 295-303.

Reference is made to the susceptibility of five species of *Corchorus* to the stem weevil. Among the wild species, *C. acutangulus* is highly susceptible to attack in spite of the presence of long hairs on the leaf and stem. *C. trilocularis* and *C. fascicularis* are less susceptible than *C. acutangulus*. In general *C. olitorius* showed less susceptibility than *C. capsularis*. It is suggested that the resistance of the former species may be due to its higher tannin content.

SUGAR PLANTS 633.6

498.

633.61:575(69.82)

**Sixteenth Annual Report of the Sugarcane Research Station,
Department of Agriculture, Mauritius 1945 (1946) : Pp. 17.**

New crosses were made, and first year seedling trials of material of the M./45 series were carried out at the Réduit and Pamplemousses Experiment Stations. Noble cane breeding (*Saccharum officinarum*) and direct nobilization of *S. spontaneum* and *S. robustum*, played a smaller part in the breeding programme than in previous years, and complex interspecific crosses involving derivatives of the noble canes and both the Javan and Indian forms of *S. spontaneum* predominated in the breeding programme. Seedling canes derived from complex crosses of this type show considerable promise as parents, and are being used in experimental crosses in combination with derivatives of *S. Barberi* and *S. robustum*. Seedling populations whose parentage involves *S. robustum* have again shown excellent germination. Direct nobilization of *S. robustum* does not, however, appear to be a promising line of breeding for conditions in Mauritius.

First, second and third year seedling trials are reported. As the result of the third year trials at Réduit, the M.5/38 (M.171/30 x S.C.12/4) and M.47/38 (M.134/32 x M.196/31) varieties have been retained for further observation. M.171/40 and M.204/40, both from the cross Ba. 11569 x M.72/31, and M.213/40 and M.233/40, both from the cross M.134/32 x M.99/34, were selected in the third year seedling trials at Pamplemousses as promising varieties for further test.

Variety trials provided information on the performance of the new varieties M.165/38, M.63/39 and M.76/39; these varieties were found to be sufficiently satisfactory for release. Testing for the resistance of selected seedlings to gumming disease and red rot is in progress.

499. WILLIAMS, C. H. B. and CAMERON, C. 633.61:575(88)
633.61.00.14(88)

Field experiments with sugar cane, XIV.

Sug. Bull. Dep. Agric. Brit. Guiana 1946 : No. 14 : 1-22.

WILLIAMS, C. H. B.

The variety and fertilizer position of the sugar industry, XI.

Ibid. 1946 : No. 14 : 23-28.

WILLIAMS, C. H. B.

Report on the sugar experiment stations for the year 1945.

Ibid. 1946 : No. 14 : 29-35.

The section "Field Experiments with Sugar Cane, XIV", presents a detailed report of 36 variety trials, including plant cane, first ratoon and second ratoon trials. In all the experiments P.O.J. 2878 was used as the standard cane.

In the plant cane, first and second ratoon trials, the following canes have shown superiority over P.O.J. 2878: D.14/34 (Co.281 x Diamond 10), Co.421 (P.O.J. 2878 x B.3412), B.34104 (Co.281 x B.H.10/12) and D.13/33 (Co.281 x Diamond 10). D.25/38 (Co.421 x Diamond 10), D.200/36 (P.O.J. 2878 x Co. 213) and D.28/38 (Co.421 x Diamond 10) are also to be further tested. Among the canes tested in the plant cane and first ratoon trials, D.21/40 (Co.421 x Co.419) and D.26/39 (Co. 421 x D.166/34) showed particular promise. As a result of the one crop or plant cane trials, only D.40/40 and B.37161 (B.3365 x B.603) are to be further tested.

The section entitled "The Variety and Fertilizer Position of the Sugar Industry, XI" gives information on the varietal percentages of recent harvests, and the commercial yields of varieties cultivated on the estates during 1945.

The report on the sugar experiment stations for 1945 includes a table of the crosses attempted and the seedlings selected during 1944.

500. LAKSHMIKANTHAM, M. 633.61:581.44
Pith in sugarcane.
Curr. Sci. 1946 : 15 : 284-85.

The pith development of Co.523, Co.527, Co.421 and Co.419 has been determined. Co.419, with 3.66% pith expressed as percentage of the volume of the entire cane, had the lowest amount of pith; Co.523, with 17.22% pith had the largest amount.

501. McMARTIN, A. 633.61-2-1.521.6(68)
Sugarcane variety and diseases. The present position.
S. Afr. Sug. J. 1946 : 30 : 499-503.

A survey is given of the occurrence of several diseases in commercial varieties in South Africa.

502. BELL, G. D. H. 633.63:581.143.26.03
Induced bolting and anthesis in sugar beet and the effect of selection of physiological types.
J. Agric. Sci. 1946 : 36 : 167-83.

Experiments are described on the use of low temperature and continuous light treatment on seedlings of sugar beet strains for isolating distinct physiological types.

STIMULANTS 633.7

503. 633.71:575(68.9)
Trelawney Tobacco Research Station. Annual report for 1944.
Publ. Tob. Res. Bd S. Rhod. 1944 : No. 8 : Pp. 59.

Varietal tests of the following varieties are reported: Jamaica Wrapper, Willow Leaf, White Stem Orinoco, Yellow Mammoth, Virginia Bright, Bonanza and Gold Dollar. Canadian imported varieties were also tested.

A report is presented of trials of selections from Bonanza, Jamaica Wrapper, Gold Dollar, Willow Leaf and White Stem Orinoco, and of selections from the crosses Gold Dollar x Jamaica Wrapper, Bonanza x Willow Leaf, Bonanza x Jamaica Wrapper and Willow Leaf x Jamaica Wrapper.

Two selections from Bonanza x Jamaica Wrapper showed promise: No. 1 (C 7) and No. 3 (C 9), with regard to high yield and good quality, respectively. Hybrids from the crosses Bonanza x Willow Leaf and Willow Leaf x Jamaica Wrapper were also promising.

No marked variation was observed in strains of Bonanza; strains Nos C 14 and C 18, however, were superior in commercial characters. Strain C 20 of Jamaica Wrapper gave a significantly higher yield than C 22, indicating the possibility of segregation within this variety of two types on the basis of vigour.

Some 400 single plant selections were made from the material studied.

Breeding for mosaic resistance was continued, use being made of resistance derived from *Nicotiana glutinosa* and Ambalema.

Work on nematode resistance was continued.

Experiments on varietal response to fertilizers are reported.

504. 633.71:575(68.9)

633.71-2.8-1.521.6:575(68.9)

Trelawney Tobacco Research Station. Annual report for 1945.

Publ. Tob. Res. Bd S. Rhod. 1945 : No. 9 : Pp. 87.

The varietal trials carried out in the previous season were repeated.

The single plant selections obtained during the previous year were tested. Selection No. 1 from Gold Dollar x Jamaica Wrapper was outstanding in growth and uniformity of plant type. In general, the results were inconsistent with those obtained in the season before. Breeding for mosaic resistance was continued. Bonanza plants with the *N* factor for resistance derived from *Nicotiana glutinosa* segregated in the expected 3 : 1 ratio of necrotic to systemic reactions, when selfed. Back-crosses were made to Bonanza, Jamaica Wrapper, and White Stem Orinoco. Leaf from the plants with the necrotic type of reaction cured well, and was distinguishable from the cured leaf of Bonanza.

Plants immune to mosaic were obtained by twice back-crossing the hybrid Ambalema x Jamaica Wrapper to Jamaica Wrapper and selfing alternately. Some of the immune plants were crossed on to White Stem Orinoco.

505. 633.72:575.42(54.8)

TUBBS, F. R.
Tea selection. I. The present position.

Tea Quart. 1946 : 18 : 59-60.

TUBBS, F. R.

Tea Selection. II. Selection of mother bushes.

Ibid 1946 : 18 : 60-65.

The purpose of this and succeeding articles is to bring together the information on various aspects of tea selection and propagation which has been obtained as the result of investigations at the Ceylon Tea Research Institute. Part I summarizes the methods of selection and propagation at present in use at the Institute; part II presents a detailed account of mother bush selection.

506. 633.73:575.42

A., P. V.
Planters' day at Lyamungu.

Mon. Bull. Coffee Bd Kenya 1946 : 11 : p. 140.

Experiments on *Coffea arabica* at the Lyamungu Coffee Research Station are described, including selection work.

507. 633.79:581.165(42.23)

WILSON, D. J.
Propagation trials with hops. II. Preliminary trials in propagation by soft-wood cuttings.

33rd Rep. E. Malling Res. Sta. 1945 (1946) : 96-103.

Reports are given of trials on various methods of hop propagation.

508. BEARD, F. H. 633.79-2.421.1-1.521.6(42.23)
**Observations on the incidence of mould (*Sphaerotheca humuli*)
 on the seedling hops at East Malling in 1945.**
 33rd Rep. E. Malling Res. Sta. 1945 (1946) : 107-14.

Observations on the occurrence of *S. Humuli* on new seedling hop varieties are recorded. There appeared to be a tendency for high yield and susceptibility to be associated and vice versa. A number of seedlings, however, which remained free of the disease are also satisfactory croppers, viz., OH44, OH77, AGG8, F14a, OB9, AOT54, AO89 and FF21.

509. SALMON, E. S. 633.79.00.14(42.23)
Twenty-ninth report on the trial of new varieties of hops, 1945.
 J. Inst. Brew. 1946 : 52 : 294-301.

The results of trials of 82 new hop varieties carried out at the East Malling Research Station in the 1945 season are reported. Information is given on the origin of the varieties, actual and estimated yields, number of bushels required to the cwt, resin contents, and varietal resistance to downy mildew.

SPICES 633.83

510. FERNIE, L. M. 633.832:581.165.72(6)
Preliminary trials on the rooting of clove cuttings.
 E. Afr. Agric. J. 1946 : 12 : 135-36.

A report is given of preliminary investigations at Amani on the rooting of clove cuttings. The cuttings which have given the most promising results are soft wood leafy terminal cuttings, taken with a heel.

OIL PLANTS 633.85

511. ALAM, Z. 633.853.49:582(54)
Nomenclature of oleiferous brassicas cultivated in the Punjab.
 Indian J. Agric. Sci. 1945 : 15 : 173-81.

A discussion is given of the taxonomy and nomenclature of the three oleiferous *Brassica* crops known locally in the Punjab as rai, sarson and toria. The three forms of rai cultivated under the local names of raya, rai and poorbi rai have been identified as *B. juncea* H. f. et T., *B. Tournefortii* Gouan. and *B. nigra* Koch, respectively. It is also shown that the yellow-seeded form of sarson is a distinct species and should be termed *B. trilocularis* H. f. et T., and that the brown-seeded sarson and toria should be regarded as subspecies of *B. campestris* and should be designated *B. campestris*, L., subsp. *campestris*, var. *dichotoma* Watt., and *B. campestris*, L., subsp. *Napus*, var. *Toria* D. et F., respectively. The possible geographical course of introduction of these crops is indicated.

512. COOK, L. J. and
 HOOPER, C. W. 633.854.78.00.14(94)
Sunflower cultivation trials with local and imported varieties.
 J. Dep. Agric. S. Aust. 1946 : 50 : 133-35.

Trials of the following sunflower varieties are reported: the Black Seeded and Grey Seeded local types of the Giant Russian sunflower, and the imported varieties, Southern Cross, Mars, Sunrise and Special Jupiter.

TANNING PLANTS 633.87

513. PHILP, J. and
 SHERRY, S. P. 633.879:581.162.3:575(68)
**The degree of natural crossing in green wattle, *Acacia decurrens*
 Willd. and its bearing on wattle breeding.**
 J. S. Afr. For. Ass. 1946 : No. 14 : 1-28.

An experiment on the selfing of green wattle trees is described. Cellophane bags were found to be more satisfactory than grease-proof paper bags, a greater mean number of mature pods and seeds per branch being obtained from branches bagged by this material. A better set of seed was also secured if the leaves were trimmed off the bagged branches.

Naturally produced seed showed a germination percentage of 79%, selfed seed 62%. In general, natural and selfed seed did not, however, differ significantly in weight or volume. The available evidence suggests that the average extent of natural crossing in the green wattle is approximately 90%.

Selfed trees segregated for seedling leaf characters, simple Mendelian ratios being obtained. The light blue green, green, and lighter green types of seedlings were found to be simple recessive characters to the normal blue green seedling. The character of light blue green seedling was lethal, that of green seedling appeared to be deleterious. The observed ratios of these seedlings in natural progenies of the same trees are attributed to the high degree of natural crossing normally occurring and the resulting heterozygosity.

Natural fertility was found to be about 72%; under conditions of artificial selfing the seed set was 27%. Selfing resulted in a significant reduction in the mean number of seeds per pod and mean pod length.

The different trees studied showed variations in the percentage of natural cross fertility as determined by counts of 200 ovules per treatment per tree, number of ovules and seed set per pod, length of pod, seed weight and volume, mucilage content of the seeds, and the degree of swelling due to water imbibition. Similar variation has been observed in the black wattle. Much of this variation is believed to be heritable.

The possibilities of breeding improved forms of green wattle are discussed, with reference to selection, hybridization and heterosis.

It is suggested that interspecific hybridization should prove a valuable method of breeding strains with desirable characters such as immunity to bagworm attack, frost tolerance, and improved tannin content. It is also suggested that use could be made of hybrid vigour by crossing inbred lines of introduced Australian wattle and South African wattle.

FRUITS AND NUTS 634

514. HUDSON, J. P. 634(93.1)

Winter fruits and vegetables in New Zealand.

Gdnrs' Chron. 1947 : 120 : 297, 307-08.

An account is given of the following fruits and vegetables: cape gooseberry (*Physalis peruviana* L.); tree tomato (*Cyphomandra betacea* Sendtn. = *Solanum betaceum* Cav.); Chinese gooseberry (*Actinidia chinensis* Planch.); feijoa (*Feijoa Sellowiana* Berg.), passion fruit (*Passiflora edulis* Sims.); Chinese persimmon (*Diospyros Kaki* L.); kumara (*Ipomoea chrysorhiza* Hook. f.), and the choco or christophine (*Sechium edule* Sw.).

515. TYDEMAN, H. M. 634:575(42.23)

A progress report on breeding work with the tree fruits.

33rd Rep. E. Malling Res. Sta. 1945 (1946) : 63-66.

An account is given of work on the production of rootstocks of apples, pears and plums, and scion varieties of apples and pears, during the last 17 years at the East Malling Research Station.

516. HOBLYN, T. N. 634.11(42.23)

The dessert apple plantation of tomorrow. What to plant and how to plan it in the light of present day knowledge.

33rd Rep. E. Malling Res. Sta. 1945 (1946) : 115-20.

Dessert apple varieties are discussed.

517. TYDEMAN, H. M. 634.11:575(42.23)

Two new apple varieties bred at East Malling.

33rd Rep. E. Malling Res. Sta. 1945 (1946) : 121-22.

Descriptions are given of the two new apple varieties, Tydeman's Early Worcester and Tydeman's Late Cox.

Tydeman's Early Worcester was selected from a cross between McIntosh Red and Worcester. It is early maturing, thus filling the gap between the ripening of the early dessert varieties, such as Beauty of Bath, and the later maturing Worcester Pearmain. The fruits are similar in appearance to Worcester Pearmain but are considered to be superior in flavour and texture. Material for grafting has been distributed.

Tydeman's Late Cox was raised from a cross between Laxton's Superb and Cox's Orange Pippin. The fruits have kept well in ordinary natural storage until May. The flavour of the ripe fruit resembles that of Cox; the flesh is yellowish, crisp and juicy. Several growers have the variety on trial, but its general distribution may be deferred for a short time.

518. KIESER, M. E. and POLLARD, A. 634.11:577.16(42)
Vitamin C in English apples.
 Nature, Lond. 1947 : 159 : p. 65.

Details are presented on the vitamin C content of a series of English dessert and culinary apple varieties. It is also mentioned that a very wide range of ascorbic acid values is presented by cider varieties.

519. MOORE, M. H. 634.2-2.3-1.521.6(42.23)
Bacterial canker and leaf spot of plum and cherry. A summary of present knowledge on control measures in Britain.
 33rd Rep. E. Malling Res. Sta. 1945 (1946) : 134-37.

The paper refers to the reaction of plum and cherry scion varieties to *Pseudomonas mors-prunorum*, and the effect of rootstock upon the incidence of the disease.

520. NANDI, H. K., BHATTACHARYA, S. C. and DUTT, S. 634.3:581.165.711(54)
Nursery behaviour of five indigenous citrus rootstock varieties with Khasi orange as scion in Assam.
 Indian J. Agric. Sci. 1943 : 13 : 489-93.

A report is given of experiments on the suitability of five indigenous citrus varieties as rootstocks for the Khasi orange (*Citrus nobilis* Lour).

521. OPPENHEIMER, H. R. 634.322:581.162.3(56.9)
(Unfruitfulness of clementines).
 Hameshek Hahaklai 1943-44 : 5 : No. 1 : 8-9; Nos 2-3 : 12-13; No. 4 : 23-13; No. 6 : p. 12.

Many clementines trees, in Palestine, although profusely blooming in March, shed their fruits early. Sometimes an undesirable spring crop is obtained. Unfruitfulness often increases as the tree grows older. Fruitful and unfruitful trees are seen side by side in the same grove.

Various environmental factors can be excluded as the probable main causes of unfruitfulness; and since unfruitful trees occur on different stocks it is unlikely that the stock plays an important part in unfruitfulness.

It is possible that unfruitful clones exist, in which case only carefully selected bud wood should be used. Sometimes, according to the growers, the same bud wood, under different conditions, yields fruitful as well as unfruitful trees. Evidence from observations in the groves points to self-incompatibility as the main cause of unfruitfulness in the clones.

Pollination experiments involving more than 900 flowers have confirmed this impression. Pollen of Dancy and Youssouf Effendi tangerines and of one clementine tree known to be fruitful was found effective in producing a fruit set. Originally unfruitful trees bear a crop of seedy fruits when interplanted with seed producing mandarins, and, to a smaller degree, with orange and lemon varieties. Different numbers of seeds are recorded according to the different pollen parents used. The number of fruit set and number of seeds per fruit decrease with increasing distance from a good pollinator. The presence of bees seems essential.

In preliminary experiments, the pollen of unfruitful clementines showed a low percentage of germination, 5 to 10% in 10-15% sugar solutions at 30° C. The few fruits observed after self-pollination were seedless.

It is likely that unfruitfulness in the clementine is influenced by both internal and external factors. Hormone production by the generative tissues and concentration of assimilated

food in trees are supposed to be the main internal factors involved. This might well explain why girdling, by raising the concentration of nutrients, is useful in some cases, though by no means in all.

However, with the amount of evidence available no definite practical suggestions can as yet be given. K. M.

522. OPPENHEIMER, H. R. 634.322:581.162.3(56.9)
(Some more investigations on unfruitfulness of clementines).

Hameshek Hahaklai 1945 : 6 : No. 4 : 13-15.

More than 5600 flowers of the clementine were pollinated in April 1944 with pollen taken from 15 different citrus varieties. The clementine proved in every case a bad pollinator, while the best results were recorded with Dancy, Youssef Eftendi, Temple and Sicilian Giant, a willow-leaf mandarin. Good results were obtained with Duncan grapefruit, Meyer's lemon, sour orange and sweet lime. Up to 40% of pollinated flowers yielded fruit. Eureka lemon, Valencia orange and Marsh seedless grapefruit were poor pollinators.

On the basis of observation in the groves, it is suggested that top working with mandarins in every third tree of every third row may suffice for commercial success. More mandarin trees might produce too high a number of seeds per fruit. The author has indeed found an average of 10 seeds per fruit on clementine trees at a distance of 12 m. from a pollinator, while fruits on branches in immediate contact with branches of a highly productive pollinator contain sometimes up to 30 seeds. The average weight of seeds in Palestine is higher than in Morocco, being sometimes 6 gm. or more per fruit.

The author endeavoured to find more trees yielding parthenocarpic fruits; some groves with such trees are named and growers are advised to secure bud wood from them.

Anatomical studies of pollen tubes growing in the styles of clementines showed that, while clementine pollen tubes, as a rule, did not even reach the upper portion of the style, Duncan grapefruit pollen reached the lower portion of the styles, six days after pollination. More proof of self-incompatibility of the clementine has thus been produced.

Experiments regarding the introduction of bees and flowering branches of mandarin into unfruitful clementine groves have given positive results, though of doubtful commercial value since large quantities of flowering limbs are required for success. K. M.

523. 634.42(93.1)
Culture of the feijoa.

N.Z. J. Agric. 1946 : 73 : 465-70.

A general account of the feijoa (*Feijoa Sellowiana* Berg.) is given, including reference to the varieties developed in New Zealand.

524. GUNARATNAM, S. C. 634.441:581.165.71:575.42(54.8)
The cultivation of the mango in the dry zone of Ceylon.

Trop. Agriculturist 1946 : 102 : 23-30.

The objectives of selection are briefly discussed, and a list is given of the varieties considered to be suitable for planting on a commercial scale. A method of budding which has been found to be successful at the Farm School, Jaffna, is described.

525. SEN, P. K. 634.441-2.8-1.521.6(54)
Black-tip disease of the mango.

Indian J. Agric. Sci. 1943 : 13 : 300-33.

In investigations on the black-tip disease of the mango fruit, a condition due to the exposure of the fruit to coal fumes from brick-kilns, varietal differences in the occurrence of the condition were observed. Susceptibility to the disease was found to be associated with greater number of lenticels.

526. ROBINSON, R. A. 634.451
Diospyros Kaki.

Gdnrs' Chron. 1947 : 121 : p. 4.

The uses of the fruits of *D. Kaki* and *D. embryopteris*, and of the woods of other *Diospyros* species, are briefly described. It is mentioned that *D. Kaki* can be grown out of doors in England, particularly in the south.

527. GLENN, E. M. and WITT, A. W. 634.51(42.23)
Progress report on the walnut variety collection at East Malling.
 33rd Rep. E. Malling Res. Sta. 1945 (1946) : 70-74.

Information is given on the walnut varieties planted at East Malling, with particular reference to tree size, time of leafing, foliage characteristics, frost injury, time of flowering and pollination, and cropping. Descriptive notes are included on the more important varieties.

528. GLENN, E. M. 634.51:581.16:575.22
Variation in non-clonal Franquette and Mayette walnuts.
 33rd Rep. E. Malling Res. Sta. 1945 (1946) : 67-69.

A description is given of the variation in growth habit, foliage, nut type and yield in walnut trees obtained from the Continent in 1926 under the names of Franquette and Mayette; the observations on the variation indicate the undesirability of unstandardized scion material in experimental work. Standard clones of the two varieties have shown marked uniformity in morphological characters.

529. MARLOTH, R. H. 634.52(68)
The pecan in South Africa.
 Fmg S. Afr. 1946 : 21 : 665-76.

Information is included on pecan varieties in the Union of South Africa.

530. HAIGH, J. C. 634.651:575.42(54.8)
The improvement of papaw by selection—II.
 Trop. Agriculturist 1946 : 102 : 17-22.

Preliminary selection work for papaw production is described. Correlation between the number of fruits and latex yield per tree is consistently positive, and in two out of the three trials reported, reached the high value of + 0.7. The correlation between number of fruits and the yield per fruit is negative and in two trials showed the low value of - 0.3; this suggests that the more fruits produced the less latex each fruit yields, largely because the fruits are smaller in size.

Variety No. 124 has been found to be superior to the other varieties investigated. Seed production of No. 124 and the testing of the progeny of trees selected within this variety will be the next stage in the work of improvement.

531. GRUBB, N. H. 634.711:575(42.23)
Malling Promise raspberry.
 33rd Rep. E. Malling Res. Sta. 1945 (1946) : p. 133.

A description is given of the new raspberry variety, Malling Promise; the variety was first distributed in 1944 under the number 51/79. It originated from a cross between Newburgh and seedling 30/8. Seedling 30/8 was obtained by selfing Seedling D, the result of a cross between selfed Pyne's Royal and selfed Lloyd George. The fruits of Malling Promise are large, short conical or ovoid in shape, and firm; so far they have been free of the tendency of Newburgh to crumble. Its dessert quality is good. The only cropping records available are from a single 12 foot row; an equivalent of four tons per acre has been obtained in years in which cane blight has not reduced the yield. Further trials are to be carried out. The variety appears to be highly resistant to natural infection by mosaic virus. When artificially infected, however, the variety shows tolerance to mosaic 2, and when graft-infected with other virus combinations it exhibits symptoms of virus disease.

FORESTRY 634.9

532. PENFOLD, A. R. and MORRISON, F. R. 634.973(94)
Eucalyptus. The essence of Australia.
 Sydney Technological Museum, 30th April 1945 : Pp. 8.

The *Eucalyptus* species providing commercial sources of oil in Australia are described.

533. HAQUE, A. 634.976.26:581.481:576.356.52
Haploid-haploid polyembryony in *Sesbania aculeata* Pers.
 CURT. Sci. 1946 : 15 : p. 287.

The occurrence is reported of a seed of *Sesbania aculeata* Pers. with twin seedlings, each of which was found to be haploid, with $2n = 12$. It is suggested that the haploid embryos possibly arose parthenogenetically from two of the nuclei of a single embryo sac.

VEGETABLES 635

534. HOWARD, H. W. 635.561:576.312.35:575.127.2
Wild and cultivated watercress types.
 J. Minist. Agric. 1947 : 53 : 453-56.

An account is given of the wild watercresses and cultivated types and varieties in Great Britain, reference being made to their external appearance and somatic chromosome numbers.

Samples of the green leaved type of cultivated water-cress have been found to possess a chromosome number of $2n = 32$, and the fruits and seeds characteristic of *Nasturtium officinale*. Samples of brown-leaved watercress had a chromosome number of $2n = 48$; this chromosome number and the characteristics of the fruit and seed indicate that the cultivated brown watercress is a hybrid between *N. uniseriatum* and *N. officinale*.

It is suggested that a colchicine-induced autotetraploid form of green cress, with thicker and broader leaves than normal cress, and the vigorous hybrid form between autotetraploid green cress and *N. uniseriatum*, might prove to be commercially valuable.

535. RAPHAEL, T. D. and WALKER, W. F. 635.652.00.14(94.6)
French beans. Summary of trials.
 Tasm. J. Agric. 1946 : 17 : 270-78.

A summary is given of trials of 28 French bean varieties.

Part II. Foreign

INSTITUTES 061.6

536. 061.6:058(72 + 8)
Tentative directory of agricultural periodicals, societies, experiment stations, and schools in Latin America.
 Div. Agric. Co-op., Pan American Union, Wash., D.C., 1945 : Pp. 90.
 (Mimeographed).

The experimental and educational agricultural institutions and the agricultural periodicals of the Latin American countries are listed in a useful directory.

*STATISTICS 519

537. 519.24
 BERKSON, J.
Approximation of chi-square by "probits" and by "logits".
 J. Amer. Statist. Ass. 1946 : 41 : 70-74.

A brief summary is given of an earlier paper by the same author in which he suggested that in graduating dosage-mortality data a logistic curve might be fitted using "logits" as an alternative to the method of probits associated with the name of Bliss. In the present paper he states that both methods use approximations for the deviations of the observed from the calculated values, and proceeds to compare the accuracies of the two approximations in several numerical cases. He concludes that, though there is often little difference, the approximation by logits is closer than that by probits. E. H. S.

538. 519.24
 GOLDBERG, H. and
 LEVINE, H.
Approximate formulas for the percentage points and normalization of t and χ^2 .
 Ann. Math. Statist. 1946 : 17 : 216-25.

The Cornish-Fisher method is used to express Student's t as a series of terms in decreasing powers of n , the number of degrees of freedom, each term being a polynomial in x , a standardized normal variate. Any required percentage point of t for any n can be obtained approximately by substituting in this series the corresponding percentage point of the normal variate x ; a table is given to facilitate the arithmetic of this substitution. A similar formula and table are given for χ^2 .

Comparison with true values shows that for ten or more degrees of freedom the approximations are highly accurate and superior to others in common use.

Inverse formulae are also given, that is, polynomials in t and in χ^2 whose distribution will be approximately normal. E. H. S.

539. 519.24
 HOEL, P. G.
Testing the homogeneity of Poisson frequencies.
 Ann. Math. Statist. 1945 : 16 : 362-68.

A sample value is drawn from each of two independent Poisson distributions. The hypothesis to be tested is that the means of the Poisson distributions are in some specified ratio. The χ^2 test, the likelihood ratio test, and a test based on the index of dispersion are compared in the case where the specified ratio is 1, and are found to be in close agreement. The author concludes that since the χ^2 test is satisfactory, special tables are unnecessary. E. H. S.

540. 519.24
 HOLLANDER, W. F.
Notes on graphic biometric comparisons of samples.
 Amer. Nat. 1946 : 80 : 494-96.

A graphical method is described for conducting a percentile analysis of the variation of any character in a series of sample populations.

* General studies, see also individual crops.

541. KAC, M. 519.24
A remark on independence of linear and quadratic forms involv-
ing independent Gaussian variables.
 Ann. Math. Statist. 1945 : 16 : 400-01.

A necessary and sufficient condition is given for the independence of the distributions of a quadratic and a linear form in a set of identically and independently distributed normal variates. E. H. S.

542. ANDERSON, R. L. 519.24:631.421
Missing-plot techniques.
 Biometrics Bull. 1946 : 2 : 41-47.

A brief review on the literature relating to the estimation of the yield of missing units in various field lay-outs is followed by the author's own calculations on the estimation of the yield of missing units in split-plot experiments.

543. CALVET, R. P. and
 ZULUETA, M. M. DE 519.24:631.421
 Métodos estadísticos para la comparación de gran número de variedades.
 (Statistical methods for comparing a large number of varieties).
 Bol. Inst. Nac. Invest. Agron. Madr. 1946 : No. 14 : 29-62.

After comparing lay-outs involving the use of random control plots or controls distributed systematically, the author describes four incomplete block methods for comparing a large number of varieties.

544. FINNEY, D. J. 519.24:631.421
Standard errors of yields adjusted for regression on an independent measurement.
 Biometrics Bull. 1946 : 2 : 53-55.

A method is presented for adjusting yield data so as to take into account the significant effect of an external factor independent of the test treatment.

545. FINNEY, D. J. 519.24:631.421
A note on "missing-plot techniques".
 Biometrics Bull. 1946 : 2 : p. 94.

With reference to a recent paper by Anderson (cf. Abst. 542), the author points out that some misapprehension has been caused by the term "missing-plot technique", which is a computational device, and not a forecast of what the yield would have been had the experiment not been interfered with.

546. DE LURY, D. B. 519.24:631.421
The analysis of Latin squares when some observations are missing.
 J. Amer. Statist. Ass. 1946 : 41 : 370-89.

Method of analysis are developed for 4 x 4 and other Latin square designs when one or more observations are lacking.

547. HARSHBARGER, B. 519.24:631.421
On the analysis of a certain six-by-six four-group lattice design using the recovery of inter-block information.
 Ann. Math. Statist. 1945 : 16 : 387-90.

This note supplements an earlier paper by the same author. Formulae are given for varietal means adjusted using inter-block information, and for upper and lower limits to the variances of these adjusted means. E. H. S.

548. SNEDECOR, G. W. and
 HABER, E. S. 519.24:631.421:635.31
Statistical methods for an incomplete experiment on a perennial crop.
 Biometrics Bull. 1946 : 2 : 61-67.

A method is proposed for inferring the hypothetical future yields of a long term experiment which involved asparagus beds cut at different dates, after the experiment had had to be discontinued.

549.

AVANZI, E.

575:633(45)

633.11:575(45)

L'impiego delle razze elette in rapporto al progresso delle coltivazioni erbacee. (**The use of selected races in relation to progress in herbaceous crop plants**).

Ann. Fac. Agrar. Univ. Pisa 1942 : 5 : (N.S.) : 749-75.

Referring firstly to wheat, it is pointed out that, in the 14 years from 1927 to 1941, the type of variety sown and the yields obtained have been completely transformed in most parts of Italy. The new early maturing varieties produced by cross breeding, had entirely replaced the old varieties in the north, except on high ground. The most successful of these new varieties were Damiano, Mentana and Villa Glori. In central Italy, Frassineto 405, Virgilio and Mentana were the most popular, and Senatore Cappelli, Frassineto 405 and Mentana in the south. The old varieties have not been replaced to the same extent in the central and particularly in the southern provinces. This is thought to be because most of them are too exacting as regards cultural conditions, and it is suggested that the production of varieties capable of giving good results under somewhat less favourable conditions might also be useful. The possible value of the older varieties as regards quality and other features, and the desirability of conserving them at least as breeding material is urged. Although wheat is by far the most important cereal in Italy, its place is taken to a certain extent by rye in the mountainous districts of the north and by barley in the south and in the islands. Imported varieties are mostly unsuitable and both crops therefore present special breeding problems. Oats are also important and present many special problems, requiring more intensive investigation.

An unparalleled improvement in rice varieties has been affected in recent years, largely as a result of the activities of the Vercelli Rice Research Station; sugar beet adapted to Italian conditions has been bred at the station at Rovigo and maize breeding has been started at a special station at Bergamo.

In potato breeding at Pisa, two hybrids of Böhm's Allerfrüheste Gelbe have exceeded this popular early variety in yield. In clovers and lucerne, selections for longevity and cold resistance have been made among populations collected from alpine regions; very marked differences in yield have been observed in different races under observation at Pisa.

Other plants receiving attention from the plant breeder include sweet sorghum, tobacco and hemp.

550. 575:633(47)

Twenty years of plant cultivation in Central Asia.

Soviet News 1946 : No. 1356 : p. 4.

A very brief account is given of investigations at the Central Asia Station of the Soviet Institute of Plant Cultivation, near Tashkent. Mention is made of a new peanut suitable for confectionery purposes; a new type of plant yielding valuable oil for the lacquer industry; new varieties of rubber-bearing plants; a new vine named Victory, with large dark blue seedless grapes said to resemble plums; new high-yielding, early maturing and disease resistant varieties of wheat, buckwheat and maize; and improved peaches, apricots and plums for the canning industry.

551. FRANDSEN, H. N. 575:633(48)

N.J.F.s Sektion for Avlsbiologi. (**N.J. F's* Section for the study of the biology of breeding**).

Nord. JordbrForskn. 1944 : No. 1 : 52-54.

The object of this Section of the N.J.F. has been co-operation and intercourse with geneticists and breeders of plants and animals in Scandinavian countries. The work has been very successful.

552. 575:633(51)

Annual Report of the National Northwestern College of Agriculture, Wukung, Shensi, China, 1946 : Pp. 74.

Wheat

The winter wheat Wukung No. 27 is described. It was derived from a single head selection

*Nordiske Jordbrugsforskeres Forening (Association of Scandinavian Agriculturists).

made in 1936, and has white semi-hard kernels and white awns. It yields 10.3% more than the farmers' Macha wheat. Information is given on the Wukung Jade spring wheat, which has been renamed from an American variety called Quality, which was introduced in 1936. Promising high-yielding and cold resistant strains have been developed from Red Monk; their kernels are, however, on the small side. Promising strains yielding 9–50% more than Wukung No. 27 have also been obtained from the crosses Wukung No. 27 x Quality, Ching Yang No. 60 x Chung Nung No. 28 and Ta Li Red Monk x Quality. Chinese spring and winter wheats were tested in the seedling stage under greenhouse conditions for their reaction to eight physiological races of stem rust (*Puccinia graminis Tritici*) and four physiological races of leaf rust (*P. tritricina*). The spring wheats were also tested for their reaction to physiological races of these diseases under field conditions. The varieties investigated included representatives of *Triticum vulgare*, *T. compactum*, *T. durum* and *T. turgidum*. The Chinese wheats appeared to be rather susceptible to the races of stem rust prevalent in North America. Many of the wheats, however, exhibited a considerable degree of resistance to leaf rust under both field and greenhouse conditions. Lines of Canadian spring wheat derived from a cross between Renown and Garnet showed resistance to stem, leaf and stripe rust. Races 6 and 13 of stripe rust (*P. glumarum*) were used in the tests. It is hoped that these lines will prove valuable in breeding Chinese wheats resistant to all three rusts.

Maize

Selfed lines are under observation, but extensive testing of their combining ability has been impossible on account of war conditions and lack of funds.

Barley

The new Wukung varieties No. 3102 and No. 3120 have been increased and distributed. They originated as single head selections of barley from the Honan and Shensi provinces, respectively. Both varieties are six-rowed barleys with long rough awns; they are cold resistant, grow uniformly and lodge only slightly.

Further work is being carried out to introduce the characters of smooth awns, resistance to lodging and smut resistance of several foreign barleys into Wukung Nos 3102 and 3120.

Millet

The new millet variety Wukung 8–696 has been selected from Wukung Hsien.

Sorghum

Wukung Ta Lo Poise is an improved kaoliang variety obtained by mass selection of a local form; in Shensi this crop is only used for obtaining an alcoholic beverage.

Potato

The Chippewa variety, now known as the Seven Million Dollars potato, has proved to be the best variety for the Shensi province among the introduced varieties tested.

Cotton

The early maturing Long Staple 33–12, Stoneville No. 4, Delfos 719 and Delfos 531 varieties are the best adapted cottons for north-western China. Selection for earlier maturity is being carried out in these cottons.

Fruit

Introduced apple varieties are under trial.

A survey has been made of the persimmon varieties cultivated in Kwan-chung, Shensi.

Soya bean

The new variety No. 509 is to be distributed. It was collected from Ho Yang Hsien, north-east of Wukung. It has the disadvantages of black kernels, indeterminate growth habit, and an insufficiently early maturity in relation to the wheat crop. Hybridization and selection are in progress to impart the characters of earlier maturity and yellow kernels to No. 509.

553. JARDINE, J. T. *et al.*

575:633(73)

Report on the agricultural experiment stations, 1944.

U.S. Dep. Agric., Wash. 1944 (1945) : Pp. 130.

A report is given of the work carried out during 1944 by the agricultural experiment stations

of the United States; plant breeding investigations have been dealt with in the summaries in *Plant Breeding Abstracts* of the annual reports of the stations.

554. JARDINE, J. T. *et al.*

575:633(73)

Report on the agricultural experiment stations, 1945.

U.S. Dep. Agric., Wash. 1945 (1946) : Pp. 172.

A report is given of the work carried out during 1945 by the agricultural experiment stations of the United States.

555.

575:633(75.8)

Silver Anniversary Annual Report of the Georgia Coastal Plain Experiment Station, Tifton, Georgia 1944-1945 : Bull. No. 42 : Pp. 156.

This annual report is the twenty-fifth, and in commemoration of the anniversary, the report covers the work done since the establishment of the Georgia Coastal Plain Experiment Station in 1919. It contains useful summaries of the results of variety tests carried out during this period.

Wheat

Only the rust resistant varieties Coker's Hardired and Sandford recommended for use in southern Georgia.

Oats

A programme of breeding for resistance to crown rust and smut has been carried out. The variety Rustproof 14 is a result of this work (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 443).

Maize

The breeding programme is described.

Crotalaria

Variety trials are reported.

Forage grasses

Breeding and selection of Bermuda grass (*Cynodon Dactylon*), Dallis grass (*Paspalum dilatatum*), Bahia grass (*Paspalum notatum*), Napier grass (*Pennisetum purpureum*), and a cattail (*Pennisetum purpureum*) are reported.

Cotton

In the programme of breeding Upland cotton, hybrids between the new variety Tifton Station 21 released in 1942, and an early maturing strain Station C, have been studied. Promising lines have been obtained which appear to combine early maturity, desirable fibre qualities and wilt resistance.

An extensive Sea Island cotton breeding programme is being carried out by the United States Department of Agriculture, in co-operation with the Georgia Coastal Plain Experiment Station and the Georgia Experiment Station.

Pecan

A summary is given of variety trials carried out during the period 1924-45.

Peanut

White-seeded hybrid selections showing promise with regard to yield and shelling percentage are under observation. Seed of a bunch type peanut, 207-3, has been released to growers; this type has given higher yields of shelled seed per acre than any other bunch or runner strain tested.

Blueberry

Breeding is in progress.

Water-melon

Breeding for wilt resistance has been carried out since 1933. Crosses of the water-melon with the citron melon or with *Citrullus Colocynthis* yielded no wilt resistant selections which were also suitable for eating. A cross between a water-melon strain from Iowa and Cuban Queen produced a wilt resistant strain with good quality which has been introduced as Georgia Wilt Resistant (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 980). Georgia No. 2

was developed from a cross between the wilt resistant Klondyke R7 and a hybrid between Stone Mountain and a wilt resistant Egyptian strain (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1593). The fruits of this variety, however, crack badly in a wet season. Georgia No. 2 has been crossed with Hawkesbury to eliminate this undesirable characteristic.

556.

575:633(76.2)

Highlights of the work of the Mississippi Experiment Station.
57th Rep. Dir. Miss. Agric. Exp. Sta. 1944 : Pp. 52.

Maize

Hybrid production is in progress.

Sorghum

Breeding of sorghum is reported. Selections and back-crosses of the cross Johnson grass (*S. halepense*) x sorghum show promise of combining short rhizomes and large stalks. Selections also show a comparatively high total sugar content and a high degree of fertility.

Sweet potatoes

Selections exhibiting promising qualities have been obtained.

Cotton

Promising new strains of Delfos and other cottons were tested (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 352).

A new strain selected from Delfos 651 shows superiority in fibre tensile strength, boll size and uniformity of fibre length; the new strain equals Delfos 651 in yield, lint percentage and staple length. The new strain Deltatype Webber 2139 is also described as promising in several respects.

Cucumber

Breeding work on pickling cucumbers is reported.

Pea

Wild winter peas are being selected for earliness, plant vigour and seed production.

At the Crystal Springs Station, the new pea varieties Nos 301 and 615 have shown outstandingly high yields and other promising commercial characteristics.

557.

575:633(77.2)

Fifty-seventh Annual Report of the Purdue University, Agricultural Experiment Station, Lafayette, Indiana for the year ending June 30, 1944 : Pp. 102.

Genetics

In investigations on *Salmonella typhimurium*, mutation rates of 0.0031, 0.0063, 0.0073 and 0.0075 were observed at temperatures of 25, 32, 37 and 40° C, respectively. This increase in mutation rate with increased temperature corresponds, it is pointed out, with the results obtained in the case of *Drosophila*.

Wheat

The leaf and stem rust resistance of unadapted hard wheats is being transferred to adapted soft winter wheats. The Fairfield variety is being used in breeding work (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 444).

Oats

Breeding work aims at the development of high quality oats with strong straw. Many crosses involving Cartier, Gopher, Bond and derivatives of Bond have been made; promising hybrid selections are under investigation.

The new disease resistant varieties Benton and Clinton are described (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 739 and Vol. XVII, Abst. 181).

Maize

Breeding for borer resistance is in progress.

Data have been obtained suggesting that the gene conditioning reaction to *Helminthosporium carbonum* race 1 is located in chromosome 1.

The new white dent hybrid, Ind. 750 [(33-16 x H21) x (K41 x K44)] has been released. It is high yielding, comparing favourably with U.S. 13 and Ind. 901, and shows freedom from stalk breaking. It is also fairly resistant to leaf blight. It is medium late maturing. Amino-acid content was found to be influenced by genetic constitution.

Barley

Promising selections of winter barley have been obtained from crosses between winter-hardy adapted varieties and disease resistant spring barleys. The new selections show disease resistance and improved resistance to lodging and straw breaking.

Lespedeza

The selected strains of Korean lespedeza, F.C. 31492 and F.C. 31493, have given improved yields of hay and seed.

Potato

New scab resistant seedlings developed by the United States Department of Agriculture are being increased. Indication has been obtained that cooking quality and fluorescent pattern are correlated.

Elm

Investigations on the production of seed under indoor conditions are reported.

Rhubarb

Breeding for resistance to crown rot is in progress.

Tomato

In breeding for resistance to *Fusarium* wilt, use has been made of the resistant red currant tomato. Promising new strains have been developed combining the desirable characters of Baltimore and Rutgers with wilt resistance.

Promising *Septoria* resistant selections have been secured from crosses involving commercial varieties and *Lycopersicon hirsutum*.

Breeding for increased vitamin C content is in progress. Studies on the inheritance of vitamin C content and fruit size indicate that increased size and high vitamin content can be combined. Breeding for improvement in several characters affecting yield and quality is reported.

Soya bean

Breeding work is described.

Sweet corn

Promising double hybrids of Country Gentleman are under test.

558.

575:633(79.8)

Ninth Progress Report of the University of Alaska Agricultural Experiment Stations 1942-1943 : Pp. 59.

Cereals

The breeding of wheat and barley is in progress at the Fairbanks Station; various hybrids are under test. Varietal trials of wheat, oats and barley are reported at the Matanuska Station.

Flax

Varietal trials of seed and fibre flax have been carried out.

Forage crops

The results of extensive trials of forage grasses and legumes are summarized. *Medicago falcata* is the only legume so far tested in Alaska which has proved to be consistently winter hardy.

***GENETICS 575.1**

559. BONNIER, G.

575.1

The genetic effects of breeding in small populations. A demonstration for use in genetic teaching.

Hereditas, Lund 1947 : 33 : 143-51.

The working of a roulette model is described for demonstrating the breeding behaviour of small populations to elementary classes.

* General studies, see also individual crops.

560. MARQUETTE, W. 575.1(47)

On the question of Russian scientists.

Science 1946 : 104 : p. 332.

Exception is taken to the concern recently expressed by Olson (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1609), as to the state of science in the Soviet Union, and in particular, as to the fate of Vavilov.

561. STURTEVANT, A. H. 575.1:007

Thomas Hunt Morgan.

Amer. Nat. 1946 : 80 : 22-23.

This obituary notice briefly reviews the pioneer genetical work of the late Professor Morgan.

562. GRANER, E. A. 575.1:007

Thomas Hunt Morgan.

Rev. Agric. Piracicaba 1946 : 21 : 97-98.

This obituary notice of the late Professor Morgan includes a brief reference to his fundamental genetical discoveries.

563. ASMOUS, V. C. 575.1:007(47)

Boris Aleksandrovich Keller 1874-1945.

Science 1946 : 104 : p. 339.

An appreciative obituary notice is presented of the well-known Russian botanist, Professor Keller.

564. 575.1:007:575.257

Lucien Daniel.

Rev. Bot. Appl. 1941 : 21 : 149-56.

This obituary notice of the late Professor Daniel includes a long criticism of his views on graft hybridization.

565. HERSKOWITZ, I. H. 575.113.7:537.531

The relationship of X-ray induced recessive lethals to chromosomal breakage.

Amer. Nat. 1946 : 80 : 588-92.

Work on *Drosophila* has provided evidence that the formation of recessive lethals after X-irradiation occurs at the loci of breakage.

566. 575.115

MATHER, K.

575.125

Dominance and heterosis.

Amer. Nat. 1946 : 80 : 91-96.

Although the concept of dominance is simple to apply when dominance is complete, its application to so-called cases of incomplete dominance depends on the scale used for representing the degree of expression of the character concerned. In addition, confusion has been caused by extending the concept to cases in which the expression of the relevant character is determined by the interaction of several genes, cases for which Wigan's concept of "potence" is more appropriate.

Having clarified these points, the author proceeds to discuss the relationship between dominance and heterosis, and he shows how necessary it is to choose a suitable scale for analysing experimental data in order to minimize metrical bias.

567. FISHER, R. A. 575.116.1

A system of scoring linkage data, with special reference to the pied factors in mice.

Amer. Nat. 1946 : 80 : 568-78.

"A method is given of scoring linkage data so that the evidence available from data of various kinds can easily be combined, and its heterogeneity examined."

568. BRITO DA CUNHA, A. 575.123:575.4

Polymorphism in natural populations of a species of *Drosophila*.

J. Hered. 1946 : 37 : 253-56.

Variation in the abdominal colour pattern of *Drosophila polymorpha* appears to be determined by two alleles of a single gene, neither of the alleles being either dominant or recessive.

The relatively great variation observed in the heterozygotes in experimental cultures may be due, it is suggested, to the presence of modifiers whose effects are more perceptible in heterozygotes than in homozygotes, or it may arise because the heterozygous phenotype is more easily affected by environmental changes than the homozygous. Under experimental conditions the heterozygotes were found to possess greater viability than the homozygotes. Analysis of the effect of natural selection upon the variation of this abdominal character is being investigated.

569. GOWEN, J. W.,
STADLER, J. and
JOHNSON, L. E. 575.125
On the mechanism of heterosis—the chromosomal or cytoplasmic basis for heterosis in *Drosophila melanogaster*.
Amer. Nat. 1946 : 80 : 506–31.

Drosophila data are provided in support of the theory that heterosis arises through the interaction of allelomorphs and of their reaction products.

570. Ross, H. 575.127.2:575.182:581.143.32:581.01
Über die Natur der Enthemmungen von plasmongehemmten *Epilobium hirsutum* ♀ x *parviflorum* ♂ -Bastarden. (The nature of the inhibition reversals in plasmon inhibited *E. hirsutum* ♀ x *parviflorum* ♂ hybrids).
Naturwissenschaften 1942 : 30 : 492–93.

A study of race hybrids of *E. hirsutum* and of the above interspecific hybrids, including also work by Brücher, showed that neither artificial nor natural environmental conditions could alter the degree of inhibition reversal, which resulted in the above interspecific hybrids from the influence of short day, and that in the hybrids of *E. hirsutum* ♀ x *E. parviflorum* ♂, certain controllable environmental factors may cause the disappearance of plasmon-genome disturbances, probably by alteration of the genetic constitution.

The effect of the factors elicited by short day is being studied.

E. W.

571. SPIEGELMAN, S. and
KAMEN, M. D. 575.17:577.15:632.422.3
Genes and nucleoproteins in the synthesis of enzymes.
Science 1946 : 104 : 581–84.

Experiments on the intracellular flux of phosphorus and on the genetics of biochemical behaviour in yeast have lead to the following concept of gene action:—

“Genes continually produce at different rates partial replicas of themselves which enter the cytoplasm. These replicas are nucleoprotein in nature and possess to varying degrees the capacity for self-duplication. Their presence in the cytoplasm controls the type and amounts of proteins and enzymes synthesized. These cytoplasmic self-duplicating units, like all such entities, would compete with each other, and the outcome of such competitive interaction would then determine the enzymatic make-up of the cytoplasm. Inherent in this concept is the possibility of changing the ultimate result of this competition by varying the conditions under which it takes place.”

It is thought that this theory will both help towards correlating data on the relationship between genes and enzymes, and also account for the apparently conflicting phenomena of Mendelian and cytoplasmic inheritance.

572. ALTENBURG, E. 575.182
The symbiont theory in explanation of the apparent cytoplasmic inheritance in *Paramecium*.
Amer. Nat. 1946 : 80 : 661–62.

In view of the approximate equality between the number of κ particles believed by Preer to characterize individuals of *P. aurelia* (cf. Abst. 573) and the number of green symbionts in *P. bursaria*, it is suggested that the former might well be colourless descendants of green symbiotic ancestors, and should therefore be regarded as symbionts rather than plasma-genes.

573. PREER, J. R. 575.182
Some properties of a genetic cytoplasmic factor in *Paramecium*.
 Proc. Nat. Acad. Sci. Wash. 1946 : 32 : 247-53.

It has been shown that κ , the cytoplasmic killer factor in variety 2 of *P. aurelia*, increases at a rate which may be slower than the rate of cell division. Should this occur, the number of cytoplasmic particles carrying κ becomes reduced, and eventually they may be removed completely. This behaviour is contrasted with that in variety 4 of the same species, where a high rate of cell division does not lead to a reduction in the κ factor.

The number of κ particles in a normal individual has been calculated at 256 and their duplication rate at 1.9 times per day.

574. VALDEYRON, G. 575.183
 Où en est le problème de la métaxénie? (What is the present position of the problem of metaxenia?)
 Ann. Serv. Bot. Tunis. 1941 : 18 : 43-55.

Any effect of pollen on the gynoeceum before fertilization is excluded from the category of metaxenia. Xenia is defined as a direct effect of pollen on the development of the endosperm. Metaxenia, on the other hand, is regarded as any effect of the pollen on the maternal tissues of the fruit. It may be of two kinds: specific metaxenia where paternal characters appear in the maternal tissues of the fruit, and non-specific metaxenia, where the effects cannot be described as manifesting paternal characters.

Armed with these definitions, the author examines recent work in this field. The need for further research is emphasized before definite conclusions can be made.

VARIATIONS, MODIFICATIONS, MUTATIONS 575.2

575. NILSSON, H. 575.22:581.163
 Totale Inventierung der Mikrotypen eines Minimiareals von *Taraxacum officinale*. (An exhaustive listing of the microtypes of a minimum area of *T. officinale*).
 Hereditas, Lund 1947 : 33 : 119-42.

An analysis of every plant in a 50 m.² sample population of *T. officinale* has shown that the number of microtypes detectable is small, only 20 in fact, and these moreover are not connected by intermediate forms. It therefore appears that the polymorphic species *T. officinale* is really highly invariable when compared to an amphimictically reproducing population.

576. KAUFMANN, B. P. 575.243:537.531:537.61-15:581.036
Modification of the frequency of chromosomal rearrangements induced by X-rays in *Drosophila*. III. Effect of supplementary treatment at the time of chromosome recombination.
 Genetics 1946 : 31 : 449-53.

Previous papers have described the effects of near infra-red radiation and of ultra-violet radiation in modifying the frequency of X-ray induced chromosomal rearrangements in *Drosophila* (cf. *Plant Breeding Abstracts*, Vol. XVII, Absts 112 and 113). The present paper reports experiments to compare the effect of given temperatures and near infra-red radiation upon X-ray induced chromosome recombination. The frequency of chromosomal rearrangements detected by analysis of the salivary gland chromosomes was higher in the group exposed to the infra-red radiation than in the groups kept at 18° or 28° C.

577. WELLENSIEK, S. J. 575.243:576.356.5:581.04
 Colchicine-mutaties en hun beteekenis voor de plantenveredeling. (Colchicine mutations and their importance in plant breeding).
 Jaarb. Algem. Bond Oud-leerl. Middelbaar Landbouwonderwijs, Wageningen 1942 : 3-12.

Mutation and the production of mutants by colchicine treatment is discussed from the scientific and practical standpoint, with examples from experiments on crop plants. The value of the induction of polyploidy for the plant breeder is explained, and the way in which the process may be best utilized to produce new improved types is indicated.

578.

STUBBE, H.

575.243:581.01

575.243:581.13

L'influenza della nutrizione sull'insorgere delle mutazioni. (**The influence of nutrition on the occurrence of mutations**).

Scientia Genetica 1940: 1: 370-84.

A study was made of the progenies of plants of *Antirrhinum majus* grown under various conditions of soil deficiency. Those from normal plants had a mutation percentage of about 1; deficiency of nitrogen, phosphorus or sulphur increased this to between 2% and 3%. On the other hand, plants grown under deficiency of all elements showed only the normal mutation rate in their progenies. It is therefore concluded that the alteration in mutation rate is the result, not of nutritive deficiency, but of disharmony between the individual elements. When the pollen of deficient plants was crossed with normal plants an increased mutation rate was observed only in the progeny of the N deficient plants. In the case of the S and P deficient plants, it is thought that the mutants had disappeared as a result of selection.

Normal plants and plants deficient in P were subjected to X-irradiation; the mutation rate in the former was 7.099 per 100 F₁ plants and in the latter 11.211 per 100 plants.

579.

TURBIN, N. V.

575.257

(**Genetically heterogeneous tissues in plants and vegetative segregation**).

Agrobiologija (Agrobiology) 1946: No. 1: 136-47.

The author seeks to prove that there is no essential difference between vegetative and sexual hybrids. He refers to numerous examples of both kinds, produced by foreign as well as Soviet plant breeders, and involving species from nearly 20 plant families. The examples are used to show that various characters can be transmitted to the progeny either sexually or vegetatively, and in various proportions, so that chimaeras are sometimes formed. I. Z

ADAPTATION 575.3

580.

*LYSENKO, T. D.

575.3

(**Soviet Darwinism**).

Agrobiologija (Agrobiology) 1946: No. 1: 7-18.

In this address, given on 27 March, 1941, the author emphasizes that the distinguishing trait of Soviet Darwinism is its practicability.

The environment is believed to have played a creative role in the origin of specially adapted organisms such as xerophytes and bog plants, and, similarly, artificial selection in the origin of crop varieties.

It is agreed that experiments have shown that the progenies of large and small seeds, in the case of cereals, or large or small roots, in the case of sugar beet, may not differ significantly, but this is held not to disprove the thesis that environment affects hereditary constitution, at least not for anyone versed in dialectical materialism.

Support for the theory that environment affects the genotype is drawn from Mičurin's work, and from tomato and other graft hybrids. Thus, a case is quoted in which a tomato with dissected leaves was grafted on to the variety Mikado, a potato-leaved variety. The leaves of the progeny of the scion were modified in the direction of the potato-leaf form.

This behaviour is explained as an effect of the environment (stock) on the genotype (scion), causing the latter to select those nutrients that produce potato-leaved plants.

Unfavourable mention is made of colchicine-induced polyploids, which are stigmatized as useless cripples in contrast to the useful and vigorous graft hybrids.

The absence of differentiation between the progenies of cereals with different sized grains, or between sugar beets with different sized roots, is attributed to the reproductive cells receiving a preferential supply of nutrients, so that, even though the individuals bearing them differ greatly, the internal environment of the reproductive cells remains uniform and gives rise consequently to uniform progenies. In this way the author would explain the physiological basis of the conservatism of the genotype.

It is stressed that different parts of the same plant may be genetically diverse, and cases are

* An extended summary of this paper is on file at the Bureau.

quoted where different parts of potatoes, the variegated Egyptian beet and the variegated *Pelargonium* have given rise to different types of offspring.

581. *PREZENT, I. I.

575.3

(Lability and stability of properties of plant organisms in connexion with their method of reproduction).

Agrobiologija (Agrobiology) 1946 : No. 1 : 63-82.

All metaphysical ideas, including the immutability of plant organs, can be overthrown by Darwinism and modern biology.

The seed embodies two contradictions; it may be stable and give rise to offspring like itself, or it may be labile, producing a range of forms. The explanation is that stable seeds are borne by wild plants, growing in a habitat to which they have become adapted, while labile seeds are produced by plants grown under new and unfamiliar conditions.

When the seed is no longer the chief reproductive organ as in vegetatively reproduced plants, it becomes rudimentary and exceedingly labile. The extent of this lability is determined by the length of time that the clone has been vegetatively propagated. By resorting once again to sexual reproduction, the lability of such seeds can be reduced, and by the operation of natural and artificial selection, their characters may become fixed to give a stable seed once again.

Lability cannot be regarded as due only to heterozygosity, since Lysenko and his colleagues have shown that a rye variety, when cross-pollinated by other rye varieties, is nevertheless stable and not labile.

Lability may be induced by the various agencies which shatter the hereditary basis of the organism, such as vegetative and sexual hybridization.

F₁ hybrids tend to be less labile than F₂ hybrids, since the seed is protected from shattering by the maternal endosperm, which receives a preferential supply of nutrients.

582. *STOLETOV, V. N.

575.3:007

(Trofim Denisovič Lysenko).

Sovhoznoe Proizvodstvo (State Farming) 1945 : No. 10 : 34-48.

In this biographical note on Lysenko, the author recapitulates briefly his early work, published in 1928, his more familiar work on vernalization, the theory of phasic development, its use in choosing parents for crossing for the production of early maturing or cold-resistant forms, summer planting of potatoes for the production of healthy sowing material, the degeneration of agricultural varieties, and intravarietal crossing.

It is stated that Lysenko answers his critics by concrete experiments and achievements of which the following are mentioned: the yield increases resulting from intravarietal crossing, the increased yields obtained from free inter-pollination of cross-fertilized plants, the increase in potato yields in the south and the improvement in their quality resulting from summer planting, the many experiments confirming the production of vegetative hybrids, and the controlled conversion of any winter form into spring forms and vice versa. Lysenko's contributions during the war included (1) the method of sowing rose ends of potato tubers used for food, (2) the improvement of germination capacity in cereal grains in Siberia and other grain regions by various methods of reducing dormancy; (3) improvement of cereal yields in Siberia by making cultural operations conform to the biological needs of the plant; (4) the discovery that winter cereals succeed in Siberia if sown in the stubble without ploughing; (5) the method of sowing kok-saghyz in clusters with local application of manures, which results in better and more even stands and greater ease of cultivation; and (6) vegetative reproduction of kok-saghyz, which leads to higher yields.

Theoretical studies on heredity and variation were also made during the war (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 117 and Vol. XVI, p. 365-6).

In concluding his appreciation of Lysenko's work, the author remarks that his success has resulted firstly from the fact that his work has been founded on the theories of Marx, Engels, Lenin and Stalin, and secondly, that all his investigations have had some practical problem as their starting point and have led to some practical method or operation. For Lysenko there is no such thing as theory and practice. There is only one single unified process of comprehending the living world.

* An extended summary of this paper is on file at the Bureau.

SELECTION 575.4

583. ILJINSKIĬ, A. P. 575.41
(Some problems and methods of the present day biocoenology).
Žurnal Obšče Biologii (Journal of General Biology) 1945 : 6 : 355-62.

In this posthumous paper, edited by E. M. Lavrenko, the author gives a brief account of his views on biocoenosis, and criticizes certain methods of experimental plant synecology. The interrelationships between the animal and plant components of a biocoenosis and the importance of the physical environment in natural selection are discussed.

ORIGIN OF SPECIES 576.1

584. *ŽUKOVSKIĬ, P. M. 576.12:575.3
(Darwinism in a crooked mirror).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : No. 1 : 71-79.

A criticism is presented of Lysenko's theory that intraspecific competition does not occur (cf. Abst. 585), the author bringing forward many examples to show that it does. Lysenko's own data on kok-saghyz, moreover, are believed to provide evidence of such intraspecific competition.

Further, since Lysenko regards intraspecific competition as non-existent, the author fails to see how new species can arise, at least not without falling back on Lamarckism. The author agrees with Haldane that there is no satisfactory evidence for the inheritance of acquired characters.

585. *LYSENKO, T. D. 576.12:631.962.4
(Natural selection and intraspecific competition).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : Nos 1-2 : 4-26.

After emphasizing that natural selection is a creative and not merely an eliminative process, the author proceeds to criticize the notion that members of the same species may compete with each other. Although Darwin and Timirjazev believed in the existence of intraspecific competition, this is stated to be erroneous and to contradict the fundamental tenets of Darwinism properly understood. Darwin's lapse is attributed to his dependence on Malthus, and is regarded as an unwarranted transference of the laws of capitalistic class society into the domain of biology.

Evidence for the absence of intraspecific competition is offered from experiments with kok-saghyz, which is stated to grow best when planted in clusters. The fact that the average weight per plant of the roots falls with an increase in the number of plants per cluster is attributed, not to competition, which would favour the strong at the expense of the weak, but to "mutual oppression" which should result in a uniform stunting of each plant. In the experiment, however, the roots were not uniform in size so that the distinction quoted above was difficult to demonstrate.

There follows a general discussion on the theory that the species is a single whole, competing only with the environment and with other species, and not indulging in internecine warfare with itself. This conclusion which is said to be derived from the methodological principles of Marx, Engels and Lenin, is then used as a basis for establishing principles for agronomic practice and breeding work, and for the elaboration of evolutionary theory.

586. TIMOFÉEFF-RESSOVSKI, N. W. 576.16:575.22:575.5
 Sulla questione dell'isolamento biologico entro popolazioni specifiche.
(The question of biological isolation within species populations).
Scientia Genetica 1940 : 1 : 317-25.

Genetic, sex-physiological and ecological are the three types of biological isolation considered. Studies of local races within a species of *Drosophila* have shown that preferential mating often occurs, so that biological selection occurs extensively even within the species. The same has been observed even between different mutants. In some cases the males selected females of their own type, in others the same female type was selected by both male types.

* An extended summary of this paper is on file at the Bureau.

587. EMBERGER, L. 576.3:007
Alexandre Guilliermond (1876-1945).
 Rev. Gén. Bot. 1946 : 53 : 337-61.

This obituary notice of the late Professor Guilliermond recounts his many contributions to plant cytology.

588. NEWCOMER, E. H. 576.311
Concerning the duality of the mitochondria and the validity of the osmiophilic platelets in plants.
 Amer. J. Bot. 1946 : 33 : 684-97.

Evidence is brought forward to disprove the theories of Guilliermond and Bowen that there exist two categories of mitochondria. It is believed that the osmiophilic platelets of Bowen are none other than artefacts produced from normal mitochondria.

589. ULLRICH, H. and VEEN, P. VAN 576.311
Dichroitische Effekte in pflanzlichem Plasma. (Dichroic effects in plant plasma).
 Naturwissenschaften 1942 : 30 : p. 1.

Experiments with dyes such as rhodamin b, neutral red and chrysoidine, acting on plasma with suitable buffers showed dichroic effects. According to the authors, these effects are evidence of an orientated fine structure, and they suggest such methods could be used to study further the structure of streaming and resting plasma. E. W.

590. BABCOCK, E. B. and JENKINS, J. A. 576.312.3:576.12
Chromosomes and phylogeny in *Crepis*. III. The relationships of one hundred and thirteen species.
 Univ. Calif. Publ. Bot. 1943 : 18 : 241-92.

The chromosome numbers of 113 *Crepis* species, representing 23 of the 27 sections forming the genus are reported; the karyotypes of the species are described and illustrated. Decrease in chromosome number, increase in the asymmetry of the chromosomes, and decrease in chromosome size were observed to be the main trends in karyotypic evolution.

591. HANEY, W. J. 576.312.315
Nucleolar numbers and attachments in *Lilium*.
 Abstr. Diss. Univ. Md 1944 : 41 : No. 6 : 15-16. (Abst.)

An attempt was made to correlate the numbers of nucleoli found in resting cells with the secondary constrictions of the chromosomes in *Lilium*. Evidence was obtained that the secondary constrictions are the points of origin of the nucleoli. Duplication of the nucleolar organizing regions was found to take place independently of duplication of the whole chromosome complement. Variation in the number and position of the nucleolar attachments was observed within each of the taxonomic groups and natural geographical groups. The value of the nucleolar attachments as a possible contribution to evidence on the phylogeny of the genus *Lilium* is discussed.

592. RESENDE-PINTO, M. C. DE 576.312.315:578.65
 Une nouvelle méthode de coloration des nucléoles—le tannin-fer III.
 (A new method of staining nucleoli—the tannin-fer III technique.)
 Portugaliae Acta Biologica, Lisboa 1946 : 1 : Sér. A : 309-10.

Nucleoli may be stained with tannin-fer III if pretreated with normal hydrochloric acid.

593. RESENDE, F. 576.312.315.581.192
 Sur la constitution histo-chimique probable de la olisthérozone nucléolaire.
 (On the probable histochemical constitution of the nucleolar olistherozone).
 Portugaliae Acta Biologica, Lisboa, 1946 : 1 : Sér. A : 265-70.

Further details are given on the author's researches into the chemical nature of the nucleolar olistherozone (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1026).

* General studies, see also individual crops.

594. WARMKE, H. E. 576.312.332
Sex determination and sex balance in *Melandrium*.
 Amer. J. Bot. 1946 : 33 : 648-60.

This account of sex determination in *Melandrium*, in which polyploids and aneuploids have been considered, contains also a general discussion of sex determining mechanisms.

595. VALADARES, M. and REGALHEIRO, I. 576.312.341
"Difference in phase" (1) in the euchromatic cycle of chromosomes of the same karyokinetic phase.
 Portugaliae Acta Biologica, Lisboa 1946 : 1 : Sér. A : 312-15.

A study of Portuguese Diptera material has shown that, although the euchromatic cycle may run its normal course taking each chromosome pair separately, the cycles of different pairs may not synchronize. Differences between pairs are believed to account for Resende's concept of irregular permanent heterochromatin and White's concept of negative heterochromatin, which two concepts are here rejected.

596. PEASE, D. C. 576.312.381:581.039
Hydrostatic pressure effects upon the spindle figure and chromosome movement. II. Experiments on the meiotic divisions of *Tradescantia* pollen mother cells.
 Biol. Bull. Wood's Hole 1946 : 91 : 145-69.

The structure of meiotic spindles and chromosomes, and the mechanism of chromosome movement during anaphase, were investigated in a study of the effects of hydrostatic pressures upon the pollen mother cells of *Tradescantia*.

597. VANDERLYN, L. 576.35
On the concepts of mitosis.
 Science 1946 : 104 : 514-15.

It is reported that the centromere and often the telomeres maintain association with the nuclear membrane during the resting stage; also that the nuclear membrane plays a role in the formation of the metaphase plate, the metaphase chromosomes occupying positions as if projected from their prometaphase position on to the single plane represented by the metaphase plate; and finally that there is a close association between heterochromatin and those loci of the chromosomes which exhibit connexion with either the nuclear or nucleolar membranes.

From these and other observations, the author suggests that heterochromatic regions may represent active surfaces through which interchange of cell substances or energy takes place between the chromosomes, nuclear sap and cytoplasm.

598. LORZ, A. P. 576.353:576.356.5:633.491
Heterocyclicity or polysomaty?
 J. Hered. 1946 : 37 : 297, 306.

The writer suggests that the cells considered by Prokofieva-Belgovskaja to be binuclear systems (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1651) and upon which she bases her hypothesis of heterocyclicity, can also be interpreted as examples of polysomaty.

599. PROKOFIEVA-BELGOVSKAJA, A. A. 576.353:633.491
"Mother" and "daughter" chromosomes. Significance of heterocyclic systems in paired nuclei.
 J. Hered. 1946 : 37 : 239-46.

The author describes observed differences between the resting nuclei of binuclear cells occurring in the cortical parenchyma of potato tubers, and between such cells during mitosis. The two nuclei of a cell undergoing mitosis are reported as showing marked differences in the mitotic cycle, staining, and the mode of spiralization. The resting nuclei of the binuclear cells were also found to show differences in staining and the number of nucleoli. On the basis of these observations, the two nuclei of the binuclear cell are regarded, not as sister nuclei, but as mother and daughter nuclei, i.e. as forming a heterocyclic system (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1651). The author discusses

the autocatalytic conception of chromosome reproduction advanced by several workers and finds support for the hypothesis of heterocyclicity. It is further suggested that heterocyclicity is the first step in the evolution of sex.

600. MULLER, H. J. 576.353:633.491

A brief comment on mother-daughter chromosomes.

J. Hered. 1946 : 37 : p. 246.

Comment is made upon the paper by Prokofieva-Belgovskaja on the heterocyclicity of binuclear cells in the cortical parenchyma of potato tubers (cf. Abst. 599 above). It is suggested that the differences in staining and general appearance in many cases observed between two contrasted groups of chromosomes may equally as well be caused by differences in nuclear environment; and reference is made to the difficulty of accepting the hypothesis of heterocyclicity, presented by the supposition entailed that all the mother chromosomes should go to one pole and the daughter chromosomes to the other. On the other hand, it is pointed out that cases of chromosome orientation are known which appear to be due to the possession of special properties by the chromosomes, and not primarily depending upon their cellular location.

601. SWANSON, C. P. and 576.356:537.531
HOLLAENDER, A. 576.356:537.61-15

The frequency of X-ray induced chromatid breaks in *Tradescantia* as modified by near infrared radiation.

Proc. Nat. Acad. Sci. Wash. 1946 : 32 : 295-302, also Biol. Wood's Hole 1946 : 91 : p. 242. (Abst.)

Pre-treatment with near infra-red radiation increases the frequency of all types of cytological aberration in the microspores of *T. paludosa* after subjection to X-irradiation. Post-treatment with near infra-red radiation increases the frequency of single deletions and exchanges, but does not affect the frequency of double deletions.

602. SHERMAN, M. 576.356.2:576.12

Karyotype evolution: a cytogenetic study of seven species and six interspecific hybrids of *Crepis*.

Univ. Calif. Publ. Bot. 1946 : 18 : 369-408.

Cytological studies of hybrids between *C. Kotschyana* ($2n = 8$) and five *Crepis* spp., each with a chromosome number of $2n = 10$, were carried out to determine the mode of caryotypic evolution of *C. Kotschyana* from an ancestral form with $2n = 10$.

The genome of *C. Kotschyana* lacks the E chromosome present in the species with $2n = 10$. The data obtained led to the conclusion that the E chromosome of the ancestor of *C. Kotschyana*, designated E', was transferred by a series of translocations to the A, C and D chromosomes. It is suggested that this transference may have occurred by successive translocations in a single strain, followed by loss of the free centromere, or by the translocation of complementary arms of E' in two separate strains, followed by the hybridization of the two strains.

603. WICHTERMAN, R. 576.356.5

Further evidence of polyploidy in the conjugation of green and colorless *Paramecium bursaria*.

Biol. Bull. Wood's Hole 1946 : 91 : p. 234. (Abst.).

The occurrence of polyploidy in the conjugation of *Paramecium* is reported. It is ascribed to the failure of a migratory pronucleus in one of the conjugants to migrate to the other conjugant, which results in the formation of one individual with a haploid pronucleus and another individual with a triploid syncaryon produced by the fusion of three pronuclei.

604. VAARAMA, A. 576.356.5:576.312.315:581.04:635.25

Experimental studies on the influence of DDT insecticide upon plant mitosis.

Hereditas, Lund 1947 : 33 : 191-219.

Aberrant mitoses have been induced by treating *Allium Cepa* and *Trigonella Foenum-graecum* with an aqueous solution of DDT, with dilute alcohol and with an alcoholic solution of DDT. The aberrations observed include chromosome contraction, a weak development

of the matrix around the chromonemata, chromosome stickiness, multipolar spindles and polyploidy. Of particular interest was the formation of metaphase nucleoli unassociated with the SAT constrictions. The various effects are thought to be due largely to a disturbance in timing relationships.

605. NYBOM, N. and KNOTSSON, B. 576.356.5:581.04:635.25
Investigations on c-mitosis in *Allium Cepa*.
 Hereditas, Lund 1947 : 33 : 220-34.

The cytological effect of three isomers of hexachlorocyclohexane on the roots of *A. Cepa* have been investigated, together with 666, the commercial insecticide containing these three isomers with a few other substances in addition. It was found that, while the γ -isomer was able to induce complete c-mitosis, and the α -isomer partial c-mitosis, the β -isomer was inactive. In view of the fact that none of these isomers is poisonous to the roots of *A. Cepa*, their use as agents for inducing polyploidy is suggested; 666, however, contains a poisonous substance and cannot be used as it is.

A cytological study was also made with three substances having vitamin K activity. Of these, methyl-naphthoquinone was able to induce complete c-mitosis, methyl-naphtho-hydroquinone diacetate partial c-mitosis, while sodium methyl-naphthohydroquinone diphosphate proved inactive. C-mitosis in these cases was unusual in that the anaphase chromosomes separated at random into two or occasionally more groups at either pole of the cell. This mode of behaviour is termed distributed c-mitosis and a possible explanation for it is proposed.

In all these experiments, c-mitotic activity was correlated with lipid solubility, and in the first group of substances, with insecticidal efficiency.

BIOLOGICAL CHEMISTRY 577.1

606. LEK, H. A. A. VAN DER and KRIJTHE, J. 577.17:581.165.72
 Over groeistoffen en hare toepassing in den tuinbouw, in het bijzonder bij het stekken. (**On growth substances and their use in horticulture, in particular in raising cuttings**).
 Meded. LandbvoorlichtDienst, Wageningen 1943 : No. 25 : Pp. 119.

This illustrated pamphlet deals fully with natural and synthetic growth substances and the technique of growth substance treatments. A classified table of many plants, including a number of tropical and subtropical origin, summarizes in schedule form the treatment and the results obtained by investigators, using growth hormones for the production of cuttings.

EXPERIMENTAL TECHNIQUE 578

607. ROMANIAK, T. H. 578.6
The use of unsaturated polyester resins for embedding biological material.
 Science 1946 : 104 : 601-02.

Details are given of an embedding technique using the plastic Selectron.

608. LANGLET, O. 578.65
A handy field method of fixing root-tips.
 Svensk Bot. Tidskr. 1946 : 40 : 425-26.

A modification of the chromo-acetic-formalin fixing method is recommended, in which two solutions, A and B are used and mixed in a proportion of 9 : 1 respectively, immediately before use. Solution A consists of 30 ml. of 35-40% formalin, 10 ml. of 96% ethyl alcohol and 130 ml. of distilled water; solution B contains 1 gm. of chromic acid, 10 ml. of glacial acetic acid and 8 ml. of distilled water.

609. SHAPIRO, S. 578.65
Warm safranin for plant tissues.
 Science 1947 : 105 : p. 50.

Plant material may be stained in safranin at 53° C. for 15 minutes instead of the 24 or 48 hour immersion necessary at room temperature. Material stained at 53° C. should be left slightly longer in absolute alcohol and the counter-stain.

610. STEYAERT, R. L. 578.85
A technique for obtaining quickly permanent mounts of nonem-bedded botanical material.
 Science 1947 : 105 : 47-48.

Aqueous mounts may be rendered permanent by withdrawing the aqueous solution by means of filter paper, and replacing it by chloralphenol. This in turn is drawn off and replaced by a solution of Canada balsam in xylol, and finally by pure Canada balsam.

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611. BLAKESLEE, A. F. 581.162:575.127.2
Removing some of the barriers to crossability in plants.
 Proc. Amer. Phil. Soc. 1945 : 89 : 561-74.

The various barriers to interspecific hybridization and the methods by which they may be overcome are discussed, with reference to experiments by the author on *Datura* spp., *Rudbeckia hirta* and other species.

612. DŽAPARIDZE, L. I. 581.162:9
(Aristotle's concept on the existence of sex in plants).
 Sovetskaja Botanika (Soviet Botany) 1946 : No. 3 : 194-99.

The author expounds the view that Aristotle was aware of the existence of sex and its role in plant propagation. Translators' errors and commentators' misreading of the original text, it is suggested, explain the fact that many writers have hitherto ascribed to Aristotle the view that plants are sexless.

613. TSCHERMAK-SEYSENEGG, E. V. 581.163
 Fruchtbarkeit ohne Befruchtung. (Spontane und künstlich bewirkte Parthenogenese). [Fruitfulness without fertilization. (Spontaneous and artificially induced parthenogenesis)].
 Anz. Akad. Wiss. Wien math.-nat. Klasse 1946 : 9 : 49-56.

A short general review is presented of the incidence of parthenogenesis in plants and animals. The utility of parthenocarpic fruit formation is indicated.

*DISEASES AND INJURIES, BACTERIA, FUNGI 632

614. ULLRICH, H. 632.111-1.521.6:576.311
 Über Strukturänderungen beim Gefrieren von Gelen. (Structural alterations during the freezing of gels.)
 Kolloidzschr. 1941 : 96 : 348-53.

It is found, on comparing varieties of plants, that depression of the freezing point of the cell sap and frost resistance run parallel to a great extent, but there are many exceptions where the relation does not hold.

Disturbances of the enzymatic processes are generally taken to be the cause of death in a plant, but that they might also ultimately depend on changes in plasma structure has not been given due attention. Certain plant species and varieties have a limiting temperature, depending on external conditions, at which the fine structure of their protoplasm is irreversibly destroyed. The causes of this is a problem of great importance in breeding for frost resistance.

If, before frost appears, a plant has been kept for some time at a low temperature, a "hardening" occurs due to changes in the plasma and as a result the lethal temperature is lowered. The author has suggested that "artificial hardening" of plant protoplasm could be induced by supplying urea to the cells.

E. W.

* General studies, see also individual crops.

615. ZAMENHOF, S. 632.3:575.242
Unstable strains of the colon bacillus. Two new mutants of *B. coli-mutabile*.
 J. Hered. 1946 : 37 : 273-75.

The isolation of two unstable strains of *Bacterium coli-mutabile* is reported, which "mutate" to each other at a high rate. The "mutation rate" has been estimated as ranging between 1 per 1000 to 1 per 5000 individual cell divisions.

616. RYAN, F. J.,
 SCHNEIDER, L. K. and
 BALLENTINE, R. 632.3:581.192:575.246
Mutations involving the requirements of uracil in *Clostridium*.
 Proc. Nat. Acad. Sci. Wash. 1946 : 32 : 261-71.

A strain of *C. septicum* requiring uracil for growth mutates to a condition of uracil independence, and the mutants in their turn back-mutate to the original condition of uracil dependence. These mutations appear to occur spontaneously.

617. DODGE, B. O. and
 SEAVER, F. J. 632.421.6:575.1
Species of *Ascobolus* for genetic study.
 Mycologia 1946 : 38 : 639-51.

After describing a new species, *A. saccoboloides*, the authors proceed to review genetical work on the genus and to indicate further subjects for research.

618. BONNER, D. and
 BEADLE, G. W. 632.421.9:575.243:577.1
Mutant strains of *Neurospora* requiring nicotinamide or related compounds for growth.
 Arch. Biochem. 1946 : 11 : 319-28.

As the result of treatment with X-rays or ultra-violet radiation, five mutant strains of *N. crassa* have been obtained which require nicotinic acid or nicotinamide for their growth. Tests of heterocaryon formation and intercrossing experiments indicate that the mutant strains include three different genetic types, each differing from the parent strain by a single gene.

619. JUKES, T. H. and
 DORNBUSH, A. C. 632.421.9:575.243:577.1
Growth stimulation of *Neurospora* cholineless mutant by dimethylaminoethanol.
 Proc. Soc. Exp. Biol., N.Y. 1945 : 58 : 142-43.

Experiments on the growth requirements of mutant No. 34486 of *N. crassa* suggested that the mutant is able to synthesize a "methyl donator", such as methionine, but is unable to synthesize the "methyl acceptor", dimethylaminoethanol, in the formation of choline.

620. BONNER, D. 632.421.9:575.243:581.192
Further studies of mutant strains of *Neurospora* requiring isoleucine and valine.
 J. Biol. Chem. 1946 : 166 : 545-54.

A previous description has been given of the X-ray induced mutant of *Neurospora*, strain 16117, which requires the amino-acids isoleucine and valine for growth, and differs from the normal form by a single gene (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 488). On the basis of the investigations reported in the present paper, it is suggested that strain 16117 is unable to convert α -keto- β -methyl-*n*-valeric acid into isoleucine, and that the resulting accumulation of this keto-acid inhibits in turn the conversion of α -keto-*iso*-valeric acid into valine. The results show that the strain is not an exception to the general observation that a single gene mutation is associated with a single chemical process, as was first believed, since the double requirement of isoleucine and valine depends on a single inhibiting factor.

621. CUTTER, V. M. (JUN.) 632.421.9:576.312.3
The chromosomes of *Neurospora tetrasperma*.
 Mycologia 1946 : 38 : 693-98.

The chromosome morphology of *N. tetrasperma* is described. Colson's report of six haploid chromosomes is confirmed.

622. DODGE, B. O.,
 SCHMITT, M. B. and
 APPEL, A. 632.421.9:577.17:575.11
Inheritance of factors involved in one type of heterocaryotic vigor.
 Proc. Amer. Phil. Soc. 1945 : 89 : 575-89.

Experiments have shown that genetic factors determining the synthesis of the complementary growth substances which result in heterocaryotic vigour in *Neurospora tetrasperma* segregate during meiosis according to Mendelian principles, and that these factors are distributed in the F_1 ascospores in such a way that the mycelia from them contain two kinds of nuclei, differing not only in the factors conditioning mating type, but also in the factors controlling the production of growth substances.

623. HANSEN, H. N. and
 SNYDER, W. C. 632.421.9:577.8:575.11
Inheritance of sex in fungi.
 Proc. Nat. Acad. Sci. Wash. 1946 : 32 : 272-73.

A mutant form of *Hypomyces Solani* f. *Cucurbitae* has been obtained, which behaves as a unisexual female, and when mated with the hermaphrodite strain, gives female and hermaphrodite offspring in a ratio of 1 : 1. When however it is crossed to a male strain, male, female, hermaphrodite and neuter progenies appear; the latter produce conidia but are incapable of acting either as males or females.

It is suggested, therefore, that the factors for male and female behaviour are not allelomorphic, but are situated at different loci on the same chromosome. Crossing over would then account for the occurrence of hermaphrodite and neuter progenies in the male x female cross.

624. SANSOME, E. V. 632.421.9:581.16:575.11
Heterokaryosis, mating-type factors, and sexual reproduction in *Neurospora*.
 Bull. Torrey Bot. Cl. 1946 : 73 : 397-409.

Evidence was obtained indicating that in *N. crassa* heterokaryosis involving both the *A* and *a* factors for mating type are not as a rule produced. Nuclei possessing the *A* and *a* factors appear to be brought into association only in sexual reproduction, probably by means of the trichogyne. The results are discussed in relation to the reproductive behaviour of *N. tetrasperma*, a "homothallic" species forming four "bisexual" spores in the ascus, and also to theories on the function of hormones and nuclear fusion in the sexual reproduction of *Neurospora*.

625. DODGE, B. O. 632.421.9:581.162.5:575.11
Self-sterility in "bisexual" heterocaryosis of *Neurospora*.
 Bull. Torrey Bot. Cl. 1946 : 73 : 410-16.

Experiments are described which throw some light on the problem of certain types of sterility in *Neurospora* spp. In two conidial races of *N. sitophila*, the factor *P* for the production of protoperithecia, and the factor *p* for the production of only a few protoperithecia appeared to segregate according to a Mendelian mode of inheritance; clear cut segregation of these characters was not, however, observed in the case of wild type races.

626. FRIES, N. 632.421.9:581.192:537.531:575.243
X-ray induced parathiotrophy in *Ophiostoma*.
 Svensk Bot. Tidskr. 1946 : 40 : 127-40.

Mutants of *O. multiannulatum* unable to utilize 6-valent sulphur have been induced by X-irradiation. At least three non-allelomorphic genes appear to be concerned in the reduction of 6-valent sulphur to the 2-valent form.

Five of the mutants proved able to utilize 6-valent sulphur once again after being cultured on a medium with sulphate as the only source of sulphur. These secondarily adapted strains could not be distinguished from the originals. Possible explanations of this apparently Lamarckian behaviour are discussed.

627. NAGEL, L. 632.422.3:576.35:578.6
A cytological study of yeasts (*Saccharomyces cerevisiae*).
 Ann. Mo. Bot. Gdn 1946 : 33 : 249-88.

It is emphasized that the literature on the cytology of the yeasts shows considerable confusion in the use of terms and in the interpretation of observations; a table is given summarizing the interpretations of several investigators on the cellular components of yeast. Sporulating and budding cultures of *S. cerevisiae* were examined by means of several techniques, which are described in detail. Some observations on budding cultures of two wild yeasts were also carried out.

In order to examine the data obtained without the bias of previous interpretations, the term "parvicarp" is adopted for that part of the yeast cell frequently designated as the nucleus and the term "magnicarp" for the body usually known as the nuclear vacuole. The "parvicarp" was found by the authoress to be a Feulgen positive, non-homogeneous cellular entity. Vegetative division does not appear to be typically mitotic in *S. cerevisiae*; the prophase of meiosis, however, resembled a typical meiotic configuration. A large-celled wild yeast showed particulate units in the "parvicarp" during mitosis. The "magnicarp" is Feulgen negative, and is generally present in budding cells, entering the bud before the "parvicarp"; in pre-sporulating and sporulating material, however, the "magnicarp" is usually invisible.

The authoress discusses her observations with reference to the work of other investigators, and suggests possible lines of future advance in cytological studies of yeast.

628. WHELTON, R. and PHAFF, H. J. 632.422.3:581.04:575.243
A nonrespiratory variant of *Saccharomyces cerevisiae*.
 Science 1947 : 105 : 44-45.

By exposing *S. cerevisiae* to ethylene oxide, a strain has been obtained which is unable to oxidize either glucose or alcohol under aerobic conditions. The variant, which is probably haploid, is devoid of cytochrome A and B, and is also lacking in indophenol oxidase.

629. MESTRE ARTIGAS, C. and MESTRES JANÉ, A. 632.422.3:581.6:634.8(46)
Fermentaciones comparativas con diferentes levaduras. (Comparative fermentations with different yeasts).
 Bol. Inst. Nac. Invest. Agron. Madr. 1946 : No. 14 : 1-28.

Comparative tests have shown that selected yeast strains may effect more rapid fermentation and a more complete transformation of sugar than unselected yeasts. Negative results, however, were obtained from experiments designed to detect whether selected yeasts could convey the characteristic wine flavours of their country of origin.

630. RENAUD, J. 632.422.3:582(44)
Les levures des vins du Val de Loire. (The yeasts of the Val de Loire wines).
 Rev. Gén. Bot. 1946 : No. 629 : 193-211, 241-74.

Full descriptions are given of the morphology, cytology, sexuality and biochemistry of yeast strains isolated from Val de Loire wines. The forms could be classified under the three species *Saccharomyces cerevisiae*, *S. ellipsoideus* and *S. pastorianus*. Certain strains intermediate between the last two species were recognized as a separate category, the *ellipsoideo-pastorianus* group.

631. ALTENBURG, E. 632.8:575.182
The "viroid" theory in relation to plasmagenes, viruses, cancer and plastids.
 Amer. Nat. 1946 : 80 : 559-67.

It is suggested that ultra-microscopic organisms, here termed *viroids*, are universally

distributed in the cytoplasm of all larger organisms, where they act as essential symbionts. The origin of these viroids is traced back to Archeozoic times, when, it is thought, the viroids may have existed as free-living pre-cellular organisms, which later invaded the cells of higher organisms and ultimately became extinct as free-living forms.

Viroids are distinguished from plasmagones in as far as the latter are not transmissible from one type of organism to another. Viruses are regarded as viroids which have suffered mutation to a pathogenic condition. Cancer, it is suggested, may be induced by viruses (neo-viruses) formed by the *in situ* mutation of the viroids of the affected organism, in contrast to the normal type of virus (paleo-virus) whose origin by mutation presumably occurred in the distant past and has since spread by transmission from one organism to another.

ECONOMIC PLANTS 633

632. LYSENKO, T. D. 633(47)
(Some fundamental problems of agricultural science.)
 Socialističeskoe Seljskoe Hozjaistvo (Socialistic Agriculture) Moscow
 1942 : No. 5 : 18-26.

This is an edited shorthand report of a speech made by the author at the plenary session of the Academy of Sciences of the U.S.S.R. held at Sverdlovsk in May, 1942. In the general discussion on the duty of science towards the community in war and peace, some details of recent practical achievements are included. Investigations in Siberia and Northern Kazakhstan showed that the crops of summer wheat, which owing to the late spring, cool summer and early autumn frosts were in danger of being completely lost during 1941, could be saved when cut at the end of August or beginning of September, even if they had not reached the state of full ripeness by that time. Experience in many collective farms indicated that this premature harvesting did not occasion the loss of the crop or reduction of yield.

Another problem which has been successfully tackled was that of winter storage of seeds of cereals. Experiments revealed that seeds, with a moisture content above normal (16-17%) which had not passed through the so-called "phase of rest" after the harvest, withstood low temperatures better than those which had already passed through this phase. It has been shown that seeds which possessed, after winter storage, a low germination capacity (30-40%) in the spring, could have their germination capacity restored by spreading them in a thin layer on the floor of a barn or grain store and keeping them at 5-20° C. for about 7-20 days. Successful results were obtained with summer planting of potatoes and with the use of the rose ends of tubers as seed material.

Preliminary experiments of sowing sugar beet in June, and not in the spring, were carried out in the Uzbek S.S.R. and gave encouraging results.

Trials are being conducted with cold resistant varieties of winter wheat for Siberia, and experiments were undertaken in field conditions with a view to determining the best times for sowing early and late varieties of spring wheat in Siberia. H. F.

633. 633(49.3)
633.1(49.3)

Liste des variétés des espèces agricoles susceptibles d'être soumises au contrôle du S.G.C. (**List of varieties of agricultural species liable to be placed under the control of the S.G.C.***).

Serv. Gen. Contr. Semences Plants Agric. Hort. 1946 : Pp. 60.

Details are given on the genetical origin, synonymy, place of origin and economic characters of the following approved or provisionally approved varieties: wheat, Alba, Institut de Gembloux, Jubilé, Professeur Delos, Rufus, Zanda, Carstens' Dickkopf V, Strubes Früh, Imperiaal IIa, Blédor, Professeur Journée, Vilmorin 27, Yga, Skandia II, Benoist 40, Pèvèle, Mendel, Soleil IV (Sun IV), Alter de Gembloux, Bersée, Chanteclair, Picardie, Vilmorin 29, Hâtif de Wattines, Précoc de Gembloux, Van Hoek, Blanc de Mansholt, Blanka and Fylgia; spelt, lines 2 and 24; barley, line 456, Vindicat, Vogel's Agaer, line 185,

* The Belgian Service General de Control des Semences et des Plants agricoles et horticoles.

Mansholt II, Fletumer, Kénia, Mansholt, Isaria, Saxonia, Maja, Bigo and Goué; rye, Court des Flandres, Petkus, Eekloo, Géant des Flandres, Waregem and Marien de Brandt; oats, Blanche Rigide de Gembloux, Breva, Espoir de Gembloux, line 979, Visota, Zenith, Binder, Mansholt III, Aigle (Eagle), Etoile (Star), Victoire (Victory), Blanche du Vieux Moulin, Altesse Jaune de Gembloux, Goka, Pluie d'Or II (Golden Rain II), Flämingsgold, Zwarte President, Noire de Gembloux, Argus and Orion II.

The names only are given of approved and provisionally approved varieties of maize, beans, peas, potatoes, sugar beet, forage beet, chicory, flax, colza, poppy, lupin, clover, marrow-stem kale and tobacco.

634.

The green-pea tree.

Soviet News 1946 : No. 1445 : p. 3.

Brief mention is made of Cicin's work on crossing herbaceous with woody plants. It is stated that peas and tomatoes growing on trees have been obtained, and apples on herbaceous plants. It is also mentioned that Cicin has been advising Byelorussian farmers on the use of perennial wheat.

633:575.127.5(47)

635.

CHEVALIER, A.

633:576.12:9

Les idées de Lamarck sur les plantes cultivées et les sources de ses informations sur leur origine et leurs variations. ((**Lamarck's ideas on cultivated plants and the sources of his information on their origin and variations**)).

Rev. Bot. Appl. 1946 : 26 : 245-55.

A sketch is presented of the development of Lamarck's evolutionary theory with regard to plants. Emphasis is laid on the prior work of Adanson and the observations on the variation of cultivated plants made by Lamarck's contemporaries Tessier and Duchesne.

636.

KRYTHE, J. M. and

WELLENSIEK, S. J.

633:576.356.5:581.04:016

Five years of colchicine research.

Bibliogr. Genet. 1942 : 14 : Pp. 132.

A useful review of literature on the induction of polyploidy in plants is presented. The review also refers to papers dealing with other actions of colchicine, in both plants and animals. Sections are included dealing with the historical development of the use of colchicine, some properties of the substance, methods of application, the various effects of colchicine, other substances with an action similar to that of colchicine, and a record of the material treated up to the date of compiling the review. In the latter section the results of treating 243 plant species with colchicine are tabulated; the amphidiploids produced are also listed. The bibliography contains 385 references.

637.

RUSSELL, P. G.

633:582(7 + 8)

Economic plants of interest to the Americas.

Office For. Agric. Relations, U.S. Dep. Agric. Pp. 29. (Undated).

The botanical and vernacular names of plants cultivated in the Americas are given in a useful alphabetical list.

638.

Botanists resume foreign contacts.

Soviet News 1946 : No. 1434 : p. 4.

Seed exchange by the Leningrad Institute of the Soviet Academy of Sciences with research institutions in other countries has been resumed.

633-1.524

639.

HAYES, H. K.

633-1.557:575.125

Yield genes, heterosis and combining ability.

Amer. Nat. 1946 : 80 : 430-45.

Among the various genes affecting yield, either favourably or adversely, are those determining resistance to disease, the elaboration of chlorophyll and plant size. The author then considers the present theories proposed to cover heterosis, and deals with the significance of combining ability.

A final section mentions the practical applications of these phenomena to the breeding of forage crops.

640. PETRI, L. 633-2.4-1.521.6
 Alcune questioni di fitopatologia generale. (**Certain questions of general phytopathology**).
 Ann. Fac. Agrar. Univ. Pisa 1940 : 3 : (N.S.) : 229-61.

The concepts of immunity and resistance are defined. Acquired immunity seems to be rare or non-existent in plants. It is therefore concluded that the utilization of the familiar hypersensitivity that exists in so many plants and can be transmitted by hybridization is the most reliable way of procuring resistant forms.

Other problems discussed are the predisposition of certain plants to certain diseases at particular periods of development or under particular environmental or other conditions. The types of manifestation of different diseases, the role of auxins, and heterothallism, biological races and variation of the fungal organism are discussed in general. The author does not consider that continued agamic multiplication of a higher plant necessarily leads to increased susceptibility to disease or to any other form of senility.

641. HAAN, H. DE 633.00.14(49.2)
 633:575(49.2)
 Raseigenschappen en rassenkeuze. (**Varietal characters and the choice of varieties**).
 Jaarb. Algem. Bond Oud-leerl. Inricht. Middelbaar Land-
 bouwonderwijs, Wageningen 1944 : 3-10.

The meaning of the several terms used interchangeably in Dutch agriculture to signify race or variety is examined and the appropriate criteria in choosing a suitable variety for particular conditions in farming are discussed with regard to winter hardiness, stiffness of straw, resistance to diseases and pests, malting quality, and starch content, according to the crop concerned.

Whether one or several varieties should be chosen by the farmers is another problem for consideration.

The main varieties of crop plants at present in Holland do not yet represent the ideal combinations of characters, but in general most of the varieties named may be regarded as successful as compared with those formerly available.

The different performance of many varieties of cereals as regards resistance to sprouting in the ear and stiffness of straw, and of potatoes, as regards earliness, is mentioned.

642. WRAAE-JENSEN, H. 633.00.14:578.08(48.9)
 Gennemførelse af lokale Forsøg. (**The carrying out of local trials**).
 Tidsskr. Landøkon. 1944 : No. 10 : 497-511.

The author discusses in detail the organization and conduct of local trials in Denmark, indicating the valuable work that has been done on manures, weed control and seed raising. Experiments with oil and textile plants could, he suggests, perhaps be best dealt with by the government research stations. He holds that the present system of research by the official stations and local trials is the surest way of providing farmers with the best possible information on problems requiring elucidation.

CEREALS 633.1

643. LAMAS, P. J. A. 633.1:575.42
 Como se juzga el valor agrícola de una variedad para grano. (**How the agricultural value of a variety of a grain crop is judged**).
 "Granos" Semilla Selecta, B. Aires 1942 : 6 : Nos 10-12: 34-35.

A brief synopsis is given of the selection criteria for grain crops in Argentina.

644. RUSAKOV, L. F. 633.1-2.4-1.521.6:575(47)
 (**Breeding cereals for disease resistance**).
 Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : Nos 1-2 :
 48-61.

Many of the plant breeding stations in the Soviet Union are criticized for giving insufficient information regarding disease resistance in the descriptions they issue of their new varieties.

Data assembled in the last seven years by the People's Commissariat of Agriculture in 15–30 phytopathological observation stations provide information on the distribution of the main diseases and on the behaviour of the main varieties of wheat, barley and oats in the different zones. The data show that the recommended varieties and the new promising varieties still under observation are more resistant than the average, except in the case of oats and winter wheat, where the new varieties are less resistant to smut.

In reviewing the practical achievements attained by wide crossing, special mention is made of the hybrids of *Triticum vulgare* with *T. durum*, *Secale* and *Agropyron*, and the new amphidiploid hybrids *T. soveticum*, *T. Borisovi*, *T. fungicidum* and *T. timococcum*. The importance of keeping abreast of the variation in the parasite and its physiological forms is mentioned. In the U.S.S.R. there is a great deficiency of rust resistant varieties of wheat and oats; a few promising ones are mentioned, however, such as Pionerka spring wheat resistant to brown rust, and Sovetskii oats, resistant to *Puccinia coronata*. Pionerka wheat also figures as one of the few varieties of soft spring wheat resistant to smut. The only really smut resistant oat is Markton, the next best being Stepnjak and Magistralj.

Combined resistance to all the main rusts and smuts is found in exceptionally few varieties, e.g. the winter wheats Pervenec Horanka and Arandany, and the oats Sovetskii, Verhnjačskii 53 and Stepnjak.

There are barley and spring wheat varieties resistant to pseudo-rosette disease but so far no oats; and there is need for varieties resistant to *Sclerotinia*, *Helminthosporium*, *Fusarium* and black chaff, as well as wheats resistant to yellow rust and bunt.

Greater attention should be given by Soviet breeders to examination of hybrids in representative zones outside that in which the particular breeding station is located; to a study of the physiological races of rust on lines such as those adopted in Canada and the U.S.A., and particularly of the races in different geographical and climatic zones; a thorough study of all local varieties, for many of them contain individuals resistant to the prevalent diseases of the neighbourhood; utilization for hybridization of the rust and smut resistant hybrids produced in the U.S.A. and a further study of the Russian varieties from which many of them have been produced; much greater attention to cold resistance and the use preferably of winter rather than spring forms as parents; crossing of varieties resistant in the early growth stages with varieties resistant in the later stages; application of intravarietal and intervarietal crossing for raising disease resistance; and particularly wide crossing. The new wheat *T. fungicidum* has proved most resistant of all.

Breeders are warned that the new varieties require constant observation and further selection; this prevents deterioration on the one hand and may lead to the production of new and improved varieties on the other.

645. VESIKIVI, A.

633.1.00.14(47.1)

633.491.00.14(47.1)

633.321.00.14(47.1)

Försöksresultat från Finska Mosskulturföreningens försöksstationer år 1940. (**Experimental results from the experimental stations of the Finnish Association for the cultivation of Bogland, 1940**).

Finska MossFören. Årsb. 1941 : 45 : 47–87.

This report contains information on the performance, on different types of soil, of various Finnish and a few other varieties in trials of clover, cereals and potatoes.

WHEAT 633.11

646. BOTTAZZI, G.

633.11(45)

Indagini su la coltivazione dei frumenti di razze elette nelle 9 provincie Lombarde. (**Studies on the cultivation of élite wheat races in the 9 provinces of Lombardy**).

Ist. Naz. Genet. Cerealicoltura, Roma 1941 : Pp. 16.

Tabular data are given regarding the areas occupied by different wheat varieties in each of the nine provinces in the years 1939–40 and 1940–41. The results show a marked tendency for the old local races to pass out of cultivation and for their place to be taken by the more modern selected varieties. Some 30 or more varieties are now grown but the conclusion is

reached that 8 main varieties would meet all the requirements; Damiano and Mentana are the best for most areas and the others would be required only where these two fail. A word of warning is sounded against hasty introduction of new varieties before they have been adequately tested.

647. CHABROLIN, C. and MIÈGE, J. 633.11:519.24:631.421
Essais comparatifs régionaux de variétés de blé. (**Comparative regional tests of wheat varieties**).
Ann. Serv. Bot. Tunis. 1941 : 18 : 145-210.

A detailed account is given of the methods used in conducting regional wheat variety trials in Tunisia.

648. LETELIER, A. E. 633.11:519.24:631.421:631.531
La densidad de siembra en relacion con los ensayos multi-varietales de cereales. (**The density of sowing in relation to trials of cereals involving many varieties**).
Bol. Téc. Minist. Agric. Chile 1943 : No. 5 : Pp. 18.

An account is given of the interaction observed between variety and density of sowing, in four comparative wheat trials laid out in Chile in 1941-42.

649. BUSTARRET, J. 633.11:575(44)
Orientation à donner au perfectionnement de nos blés. (**How we should set about improving our wheats**).
Comm. Sta. Nat. Encouragement Agric., Paris 1943 : Pp. 15.

After reviewing the history of French wheat varieties from the land race stage, through the early breeding period dominated by the House of Vilmorin, till the present day, the author indicates what progress has been made and what objectives still await achievement. The discussion ranges under the following heads: resistance to cold, heat, drought, yellow, brown and black rusts, smut and bunt, the development of varieties able to function either as spring and winter cereals, quality, and regional adaptation.

650. I frumenti "Italo Balbo", "Comandante Baudi", "Comandante Novaro". 633.11:575(45)
(**The wheats Italo Balbo, Comandante Baudi and Comandante Novaro**).
Ist. Naz. Genet. Cerealicoltura, Roma 1941 : 19 : Pp. 7.

Descriptions are given of three new wheats inscribed in the Italian national variety register in 1940. The first is a hybrid of Balilla x Ardito, and is characterized by resistance to lodging, rust and frost. The second and third are hybrids from the cross (Hâtif Inversable x Rieti 87-1921) x Ardito 1922, and are possessed of the same qualities as the first. All three varieties are early in maturity, though somewhat later than Mentana.

651. I frumenti "Bruno", "Eia", "Alalà". 633.11:575(45)
(**The wheat varieties Bruno, Eia and Alalà**).
Ist. Naz. Genet. Cerealicoltura, Roma 1942 : 20 : Pp. 9.

Three new varieties produced by the late N. Strampelli and inscribed in the national variety register in 1942 are described. Bruno is a hybrid of Balilla x Villa Glori, is resistant to lodging and ripens only two to three days later than Mentana. The other two also possess good standing capacity but ripen some four to five days after Mentana.

652. SÉGUÉLA, J. M. 633.11:575(61.1)
Technique de la sélection du blé en Tunisie. (**Technique of wheat breeding in Tunisia**).
Ann. Serv. Bot. Tunis. 1941 : 18 : 67-143.

Extensive practical details are given of the techniques practised in breeding new varieties of Tunisian wheat. These include selection of the extremely heterogeneous land races, the introduction of foreign varieties, the detection of mutants and hybridization. Information is also appended on the methods used for multiplying new varieties and ensuring varietal purity.

653. STARLING, T. M.,
WINGARD, S. A. and
McVICKER, M. H. 633.11:575(75.5)
Vahart wheat, a new variety for Virginia.
Bull. Va Agric. Exp. Sta. 1946 : No. 386 : Pp. 4.

The Vahart wheat has been selected from Redhart. It is high yielding, and is a week later in maturity, slightly taller and more resistant to lodging than Redhart. It has proved to be one of the most resistant varieties to loose smut in tests in Virginia. It is, however, susceptible to leaf rust, but is no more susceptible than other commercial varieties.

654. CUTLER, G. H. 633.11:575(77.2)
Fairfield wheat.
Circ. Ind. Agric. Exp. Sta. 1942 : No. 276 : Pp. 8.

A detailed account is given of the Fairfield variety of soft winter wheat (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 444).

655. CAFFERA, R. 633.11:575(82)
Cuatro nuevas variedades de trigo de inscripción definitiva: Benvenuto Inca, Buck Claromecó, Klein 157 y Klein Alberti. (**Four new varieties of wheat definitively registered: Benvenuto Inca, Buck Claromecó, Klein 157 and Klein Alberti**).

"Granos" Semilla Selecta, B. Aires 1945 : 9 : Nos. 7-9 : 35-37.

Descriptions of these four varieties have been published in an earlier paper (cf. Abst 656). Additional details are added on agronomic behaviour.

656. HOROVITZ, N. 633.11:575(82)
Descripción de algunas variedades de trigo cultivadas en la Argentina.
(**Description of some wheat varieties cultivated in Argentina**).
Rev. Argent. Agron. 1944 : 11 : 195-204.

Four new recently approved wheat varieties are described: Buck-Claromecó, from Kanhard x Lin Calel M.A., a bearded hard medium-late variety; Klein 157, from Hope x Lin Calel M.A., another bearded hard medium-late variety; Klein-Alberti, from (Record x 38 M.A.) x Klein-Palantelén, a bearded semi-hard early form; and Benvenuto-Inca, from Mentana x Lin Calel M.A., another bearded semi-hard early form.

A key is appended to all the commonly grown Argentine wheat varieties.

657. AUSEMUS, E. R. *et al.* 633.11:575.1
A summary of genetic studies in hexaploid and tetraploid wheats.
J. Amer. Soc. Agron. 1946 : 38 : 1082-99.

The problems of establishing a standardized system of genetic nomenclature for wheat are discussed, and recommendations are put forward for co-ordinating future work on wheat genetics.

A table gives the recommended gene symbols and mode of inheritance of the characters which have been studied in the tetraploid and hexaploid wheats, together with the references on each character. Linkage relationships are summarized in a second table. The appended bibliography contains 236 references.

658. ZHEBRAK, A. R. 633.11:575.127.2:575.129:581.04(47)
New amphidiploid species of wheat and their significance for selection and evolution.
Amer. Nat. 1946 : 80 : 271-79.

It is reported that colchicine-induced amphidiploids of the following interspecific combinations of wheat have been obtained: *Triticum durum* x *T. monococcum*, ($2n = 42$); *T. durum* x *T. Timopheevi*, ($2n = 56$); *T. turgidum* x *T. Timopheevi*, ($2n = 56$); *T. persicum* x *T. Timopheevi*, ($2n = 56$); *T. polonicum* x *T. Timopheevi*, ($2n = 56$); *T. orientale* x *T. Timopheevi*, ($2n = 56$); *T. polonicum* x *T. durum*, ($2n = 56$); *T. vulgare* x *T. Timopheevi*, $2n = 70$; and *T. durum* x *T. vulgare*, ($2n = 70$). All the 56-chromosome amphidiploids obtained from crosses between 28-chromosome species and *T. Timopheevi* are assigned to a separate species, *T. soveticum*. Specific rank has also been given to two other amphidiploids, *T. durum-monococcum* and *T. vulgare-Timopheevi*.

Investigations have been carried out on the crossability and hybridization of the amphidiploid subspecies.

It has been found that the subspecies cross readily *inter se*, and that the first and subsequent generations are highly fertile. Segregation of forms resembling the parental species does not occur in the F_2 ; a wide range of varieties, however, has been observed, including the recombination of specific and subspecific characters, with the appearance of new homozygous combinations of characters of the parental species and subspecies. The amphidiploids also show a marked tendency to cross-pollinate.

Hybrids have been obtained by crossing the following 56-chromosome amphidiploids with *T. vulgare*, *T. durum-Timopheevi*, *T. turgidum-Timopheevi*, *T. persicum-Timopheevi*, *T. polonicum-Timopheevi* and *T. orientale-Timopheevi*. All these hybrids have a chromosome number of $2n = 49$. Hybrids of the following three combinations of amphidiploids have also been secured: *T. persicum-Timopheevi* \times *T. durum-monococcum*; *T. durum-vulgare* \times *T. turgidum-Timopheevi*; and *T. polonicum-durum* \times *T. durum-Timopheevi*. The fertility of both groups of hybrids was low.

The strong dominance of certain genes has been shown in the complex interspecific material studied, as for example, in the case of the dominant gene for black spike colour, and the dominant gene for the angular notch between the teeth of the glume.

In addition, amphidiploids from crosses of species with homologous chromosomes have been investigated. Types with $2n = 56$ have been obtained by colchicine treatment of hybrids between *T. polonicum* and *T. durum*, whose characteristics resemble those of autotetraploids, particularly in respect of low fertility.

Low fertility is also shown by amphidiploids between *T. vulgare* and *T. durum*.

At present, work on the amphidiploid types of wheat consists of selection by the usual mass and individual selection methods, and hybridization and selection of crosses between different 56-chromosome types.

659.

633.11:575.127.5:633.14-2.111-1.521.6

New wheat-rye hybrid.

Soviet News 1947 : No. 1636 : p. 2.

A high yielding frost resistant wheat-rye hybrid has been developed by Oseledec at the Ukrainian Agricultural Research Institute.

660.

KHOLODNY, T.

633.11:575.127.5:633.289(47)

The birth of perennial wheat.

Soviet News 1946 : No. 1562 : p. 2.

An account is given of Cicin's investigations on crossing wheat with *Agropyron*. Reference is made to a meeting between Mičurin and Cicin in 1927, at which Mičurin made the suggestion of improving wheat by remote hybridization.

661.

SUNESON, C. A. and

POPE, W. K.

633.11:575.127.5:633.289(79.4)

Progress with *Triticum* \times *Agropyron* crosses in California.

J. Amer. Soc. Agron. 1946 : 38 : 956-63.

The results of seven years' tests of derivatives from crosses of *Triticum* spp. with *Agropyron trichophorum* or *A. elongatum* are reported.

Most of the derivatives show the perennial habit; very good survival for two to three years has been observed.

None of the perennial strains has yielded more than 60% of the yield of the highest yielding wheats in a single harvesting during the first year of growth; yields in the second year have been consistently less than half those during the first. A few strains possess milling and baking qualities similar to those of wheat. Lines suitable for forage use have been readily obtained, but these could only be used in pure stands, on account of the fact that they head later than native annual and perennial grasses in California, and would, therefore, have no opportunity for reproduction on a continuously grazed range.

In a study of the reaction of the hybrids to stem rust, five clearly defined classes of reaction were observed, viz., immune, resistant, moderately resistant, susceptible and very susceptible.

The material has proved to be fairly fertile, seed sets of 13 to 50% being obtained; in backcrosses to wheat, a high degree of interfertility has been obtained.

Blue, grey and brown coloured seeds have been produced by the hybrids.

Characteristics which are apparently induced by short day length, since they develop under field conditions in November and early December, have also been observed. At the top node of the plants, rooted proliferations or mops may be formed; these have a potential value in thickening stands. Plants with noded stems, short internodes, and stubby leaves have also occurred in late autumn. A stem curvature above the top node which sometimes directs the spike downward into the protective cover of the stubble may play a significant part in frost resistance.

Although the seed yields of the perennial forms are not sufficient for grain production, it is suggested that these forms might be used for one year for seed production and two years for grazing purposes.

662.

HUSKINS, C. L.

633.11:575.242

633.13:575.242

Fatuoid, speltoid and related mutations of oats and wheat.

Bot. Rev. 1946 : 12 : 457-514.

A critical review is given of literature on the genetics of fatuoid, speltoid and related mutations occurring in wheat and oats. A bibliography of 215 references is appended.

663.

MEDVEDEVA, G. B.

633.11:575.3

(Directed variation in wheat hybrids).

Agrobiologija (Agrobiology) 1946 : No. 1 : 89-94.

F_1 hybrids of *Triticum dicoccum* var. *rufum* x *T. persicum* var. *fuliginosum* were grown on the one hand under favourable conditions, so as to favour the characters of the cultivated parent, and on the other hand under unfavourable conditions, so as to favour the development of the characters of the wild parent. The plants in the former experiment were sown in good soil in hot beds at the normal time, the plants of the latter experiment in poor, unmanured soil, in February in the greenhouse, and kept insufficiently watered. Hybrids in the first experiment resembled the *T. persicum* variety and those in the second resembled *T. dicoccum*. The resemblance was expressed both in external features and in quantitative characters such as length of ear, spikelet and glumes, and number of spikelets.

Seed from each experiment was divided into two parts and one part sown in each of the two sets of conditions again. The F_2 segregated so widely that it was not possible to speak of maternal or paternal types. However, the F_2 from the large eared F_1 contained a larger proportion of large eared plants than the F_2 from the small eared F_1 , when both were grown under the same conditions, and the same was true for the other characters examined; but the plants grown in the more favourable conditions had a greater proportion of small seeds than those grown in the less favourable conditions.

When both the F_1 and F_2 were grown under better conditions the effect was cumulative; thus the maximum ear length was 118 mm., as compared with 78 mm. when the F_1 was grown in good and the F_2 in poor conditions, and 73 mm. when both were grown in poor conditions. Figures for number of spikelets were respectively 24, 23 and 32, and length of glume behaved similarly.

These results are thought to lend strong support to Mičurin's views regarding the influence of conditions of rearing on hereditary constitution.

664.

FILIPČENKO, S. A. and

ŠELOMOVA, N. A.

633.11:575.3:581.143.26.03

(The identity of different forms of shattered inheritance).

Agrobiologija (Agrobiology) 1946 : No. 1 : 83-88.

Shattered inheritance, it is explained, consists in the absence in the organism of the capacity to select definite conditions from the environment and to wait for them if they are not already present. An organism with shattered inheritance will assimilate indiscriminately any conditions that happen to be present, and so will vary in the most manifold directions. This accounts for the wide variation that is observed in the progenies of wide crosses and in uncrossed populations of plants introduced into new localities.

Experiments are described in which a winter wheat was subjected to partial vernalization and the progeny proved to be modified in the direction of spring habit; one progeny was obtained which consisted entirely of spring forms and ripened one to two days before the earliest spring wheats. Exceptional variability was observed in the plants obtained, no two of which were alike. Moreover, the variation transgressed the range of variation of the parent form, botanical variety and even species. The F_2 generation showed remarkable resemblances to the F_2 of the wheat x rye hybrids obtained at Saratov; forms with violet coloured seedlings and velvety leaf pubescence being observed, characters not present in the parent forms. As well as forms resembling *Triticum vulgare* there were others resembling *T. dicoccum*, *T. durum*, *T. Spelta* or the wild wheat species; others could not be ascribed to any known species. The shattered population obtained by partial vernalization and the shattered progenies of the wheat x rye hybrids were not, however, identical in every respect; those from the wheat x rye crosses showed clear signs of resemblance to the rye parent in a number of respects while those from partial vernalization showed a predominant tendency to be spring forms. The results, however, are regarded as showing that the results ascribed by Mendelists to combinations of genes, chromosomes and genomes can be obtained without any such combination, simply by changing the conditions of development of a pure variety.

665.

633.11:576.356.52:581.162.3

633.11:576.356.52:537.531

SMITH, L.

Haploidy in einkorn.

J. Agric. Res. 1946 : 73 : 291-301.

The occurrence of haploids under the following conditions was investigated in *Triticum monococcum* L.: in untreated populations, among F_1 interspecific hybrids, after X-ray treatment of the pollen, as the result of delayed pollination, and among twin seedlings.

Haploids occurred in untreated populations, among F_1 intraspecific hybrids and after delayed pollination at the rate of approximately one haploid per 1000 plants, 20 haploids per 1000 plants, and up to 200 per 1000 plants respectively.

Exposure to moderate dosages of X-rays did not increase the frequency of haploids in *T. monococcum*, tetraploid wheat, hexaploid wheat, or the amphidiploid *T. monococcum* x *Aegilops uniaristata* ($2n = 28$).

It has been observed that twin seedlings occur only rarely in naturally selfed and open-pollinated progenies.

The haploids obtained were investigated with regard to their meiosis, fertility and progeny. Bivalents were observed in 3.2% of the cells examined; bridges occurred with a comparable frequency. At metaphase the chromosomes frequently showed a group of four. The significance of this observed arrangement as an indication that the basic chromosome number in wheat is five, is discussed, with reference to the possible interpretations of secondary pairing as an artifact, as a consequence of the cytoplasmic structure, or as a true indication of chromosome homology.

666.

GESLIN, H.

633.11:581.143.26.03(44)

Etude des lois de croissance d'une plante en fonction des facteurs du climat. (Température et radiation solaire). Contribution à l'étude du climat du blé. [Study of the laws of growth of a plant as a function of the factors of the climate (temperature and solar radiation). Contribution to the study of the climate of wheat]. Thèses Fac. Sci. Univ. Paris 1944 : Sér. A. No. 2087 : Pp. 116.

This physiological study includes a section on the response of French wheat varieties to vernalization.

667.

CASTIGLIONI, J. M.

633.11:581.4:581.02:631.557(82)

Influencia de la época y densidad de siembra sobre algunos caracteres morfológicos en ocho variedades de trigo. Análisis biométrico. (Influence of the date and density of sowing on some morphological characters in eight varieties of wheat. Biometric analysis). "Granos" Semilla Selecta, B. Aires 1941 : 5 : Nos. 7-9 : 3-46.

A detailed biometric analysis has been made of the effect of sowing date, density of sowing and other environmental factors on the morphology of the eight Argentine wheat varieties:

Lin Calel, Gral. Urquiza, Guatraché, Klein 32, San Martín, Vencedor, Sola 50 and Candéal. Correlations have been investigated between the various morphological characters studied and yield.

668. D'ANDRE, E. 633.11:581.6(82)

Aptitudes y características según zonas de veinticinco variedades de trigo que se incluyeron en el ensayo comparativo de rendimiento de 1943 (cosecha 1943-44). [**Capabilities and characteristics according to geographical zones of twenty-five varieties of wheat which were included in the comparative yield trial of 1943 (1943-44 crop)**].

"Granos" Semilla Selecta, B. Aires 1946 : 10 : Nos. 4-6 : 5-32.

Data are presented on the yield, optimum sowing time, 1000 corn weight, and milling and baking quality, including protein and gluten contents, of the following Argentine varieties: Klein Otto Wulff, Sinvalocho M.A., Klein Exito, Klein Pirámide, Klein 157, Klein Sinmarq, Buck Quequén, Massaux No. 1, Guatraché M.A., Buck Claromecó, Buck Araucano, Benvenuto Inca, Reliance sel. Klein, Kanhard sel. Buck, Klein Alberti, Klein Cometa, Klein Amalia Klein, Klein 33, Klein 32, La Previsión 25, Benvenuto 1761, Sola 50 sel. Buck, Kanred sel. M.A., 38 M.A. Po4/27, Eureka F.C.S. and Superhard Blackhull c/b.

669. D'ANDRE, E. 633.11-2-1.521.6:581.6:575.12(82)

La calidad industrial de los trigos. (**The industrial quality of wheats**).

"Granos" Semilla Selecta, B. Aires 1946 : 10 : Nos. 1-3 : 46-49.

In this short discussion on the milling and baking quality of wheat, reference is made to the necessity of combining high quality and disease resistance in Argentine wheats by means of hybridization.

670. STAKMAN, E. C. 633.11-2.4:576.16:631.521.6:575(73)

Plant pathologist's merry-go-round.

J. Hered. 1946 : 37 : 259-65.

The general problems of breeding for resistance to fungous diseases are reviewed, reference being made chiefly to the diseases of wheat.

671. SIBILIA, C. 633.11-2.452:576.16(45)

Due razze fisiologiche di *Puccinia triticina* Erikss. et Henn. del campo sperimentale di Filippiomboli. (**Two races of *P. triticina* Erikss. et Henn. from the experimental field at Filippiomboli**).

Ann. Ente Consorziale Interprov. Toscano Sementi, Firenze 1939-42 : 3 : Pp. 5.

A race new to Italy is described; it infects Malakoff and all other differential hosts tried, with the exception of Webster, which it fails to attack at all. It corresponds to no race known to the author and is designated race T.

The second race studied proved to be race 61.

672. SIBILIA, C. 633.11-2.452:576.16(63)

Alcune razze fisiologiche di "*Puccinia graminis tritici*" Erikss. et Henn. nell'Africa Orientale Italiana. (**Some physiological forms of *P. graminis Tritici* Erikss. et Henn in Italian East Africa**).

Bol. Patol. Veg. Roma 1940 : 20 : 115-18.

Two further races studied have proved to belong to A.O.I. 13 and A.O.I. 3, respectively.

673. VALLEGA, J. 633.11-2.452:576.16:631.521.6(81)

Razas fisiológicas de "*Puccinia triticina*" procedentes de Ipanema, San Pablo, Brasil. (**Physiological races of *P. triticina* coming from Ipanema, San Pablo, Brazil**).

Rev. Argent. Agron. 1941 : 8 : 57-59.

Races 19, 64 and 105 of *P. triticina* have been collected from Ipanema.

674. ATKINS, I. M. and
MCFADDEN, E. S. 633.11-2.452-1.521.6(76.4)
Rust resistant Austin.
Sth Seedsman 1946 : 9 : No. 11 : 22, 38.

An account is given of the rust resistant Austin variety of soft red winter wheat (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 517).

675. PAINTER, R. H. and
JONES, E. T. 633.11-2.7-1.521.6
The Hessian fly resistance of Pawnee wheat.
J. Kans. Ent. Soc. 1945 : 18 : 130-49.

A detailed account is given of the variety Pawnee (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1208), and in particular, of its genetical origin and resistance and tolerance to Hessian fly infestation.

BUCKWHEAT 633.12

676. SINOTÔ, D. and
SATÔ, D. 633.12:576.356.5:581.04
Poliploidi da colchicina in *Fagopyrum*. (**Colchicine polyploids in *Fagopyrum*.**)
Scientia Genetica 1940 : 1 : 354-69.

By placing one drop of colchicine solution on the plumule of germinating seeds each day for several days, a number of polyploid and mixoploid plants were obtained. Various meiotic irregularities were observed in both tetraploid and octoploid plants obtained by the treatment.

The polyploid plants had larger stomata and thicker leaves; they bore large numbers of flowers but produced no seeds.

A greater proportion of euploid plants was obtained in treatments for a few days or with relatively weak solutions, whereas stronger dosage tended to produce a greater number of mixoploids.

OATS 633.13

677. COFFMAN, F. A. 633.13:576.16
Origin of cultivated oats.
J. Amer. Soc. Agron. 1946 : 38 : 983-1002.

The author suggests that the wild red oat, *Avena sterilis*, is the progenitor of the cultivated oat *A. sativa*, in contrast to the usually accepted view that *A. nuda* is the ancestor of *A. sativa*. This theory is based upon a comprehensive review of the relevant information on the morphology, histology, cytology, genetics, pathology, physiology and phytogeography of the different oat species. The author considers it likely that *A. sterilis* is the progenitor of all oat species with $2n = 21$, including the commonly cultivated species. *A. fatua* and *A. sativa orientalis*, it is suggested, are aberrants which probably appeared after the evolution of the cultivated oats from the wild. It is pointed out that, in investigations in America, oats similar to *A. nuda* have been obtained from *A. sterilis* derivatives, and that plants showing resemblances to *A. sativa orientalis* have been found in the progeny of crosses involving derivatives of *A. sterilis*.

The paper cites 87 references.

678. HARRINGTON, J. B. 633.13-1.531.27:575
633.16-1.531.27:575
The differential response of spring-sown varieties of oats and barley to date of seeding and its breeding significance.
J. Amer. Soc. Agron. 1946 : 38 : 1073-81.

A study was made of the effect upon 53 barley varieties and 58 oat varieties of sowing at two different dates, both dates being within the usual seeding period. In many cases a given variety gave a different performance when sown at the two dates, a result which indicates the desirability of testing at two dates instead of one in variety testing and selection of segregating hybrids.

679. CALDWELL, R. M.,
MULVEY, R. R. and
COMPTON, L. E. 633.13-2.4-1.521.6:575(77.2)
Benton and Clinton new disease resistant spring oats.
Bull. Ind. Agric. Exp. Sta. 1946 : No. 514 : Pp. 10.
The new spring oat varieties Benton and Clinton are described (cf. Abst. 558). Both varieties were developed from the cross (Richland x Green Russian) x Bond. They possess resistance to leaf and stem rust, smut and leaf blight.

680. MEEHAN, F. and
MURPHY, H. C. 633.13-2.484-1.521.6
A new *Helminthosporium* blight of oats.
Science 1946 : 104 : 413-14.
H. Victoriae is a newly discovered parasite which has proved serious on oat varieties deriving their rust resistance from Victoria.

681. 633.13.00.14(41.5)
Oat variety trials.
J. Dep. Agric. Eire 1946 : 43 : 88-89.
Trials to compare the new hybrid oat, Glasnevin Triumph, with Ardri were carried out at 33 locations in 1945. Glasnevin Triumph was developed by the Plant Breeding Department of University College, Dublin, from a cross between Ardri and Glasnevin Success. The two varieties showed no significant differences in yielding capacity. In the majority of reports received, Glasnevin Triumph was found to be superior in quality to Ardri.

RYE 633.14

682. POGOSJAN, S. A. 633.14:575.114:575.3
(Overcoming the depression in the progeny of inbred plants).
Agrobiologija (Agrobiology) 1946 : No. 1 : 123-29.
Plants of two rye varieties, Petkus and Taraščanskaja were divided vegetatively and the parts were reared until the flowering stage under different sets of manurial conditions. Plants of each set of conditions were then brought together in such a way that ears of individuals originating from the same initial plant were allowed to pollinate each other. The results varied widely from plant to plant, but it is concluded that the set was higher than that obtained from ordinary inbreeding and that the progeny were more uniform.

683. WELLENSIEK, S. J. 633.14:575.3:631.557
Ras, zaaitijd en bemesting bij rogge. (**Race, sowing time and manuring in rye**).
Meded. LandbouwlichtDienst, Wageningen 1944 : 145-53.
The detailed results of a field trial with Marien and Petkus rye under different conditions, as regards sowing time and manuring, but on the same soil and in the same year, afford evidence of the effect of external factors upon the yield of different varieties.

684. KRASNJUK, A. A. 633.14:581.162.32
(Supplementary artificial pollination in rye).
Agrobiologija (Agrobiology) 1946 : No. 1 : 133-35.
Artificial supplementary pollination of rye plots varying from 0.1 to 1.0 hectares resulted in increases in grain yield calculated at from 1 to 2.5 centners per ha. A greater effect was observed in years when the air was still at the time of flowering. The grain produced by treatment also gave rise to plants with a higher yield, the difference in this case being 1.4 c. per ha.
The best results were observed when supplementary pollination was performed daily during the flowering period. It is performed by two workers walking through the field with a taut cord which they lightly draw along the ears.

685. BASCIALLI, P. C. 633.15(82)
Características agrícolas de las variedades comerciales de maíz. (**Agricultural characteristics of the commercial varieties of maize**).
"Granos" Semilla Selecta, B. Aires 1946 : 10 : Nos 4-6 : 39-43.

A brief survey is presented of the salient agronomic features of commonly grown Argentine maize varieties.

686. ETCHECOPAR, J. A. and ILLIA, M. C. 633.15(82)
Descripción de las principales variedades de maíz cultivadas en la Argentina. (**Description of the principal varieties of maize cultivated in Argentina**).
Rev. Argent. Agron. 1944 : 11 : 175-94.

A full description is given of the origin and morphology of the varieties, Colorado Casilda M.A., Colorado Manfredi M.A., Colorado Klein, Cuerentón Colorado Klein, Amarillo Klein and Amarillo Canario Klein.

687. MARINO, A. E. and LUNA, J. T. 633.15:519.24:631.421
Planeos de ensayos en blocks incompletos (lattice y lattice balanceado).
Análisis de resultados en ensayos con maíces. [**Designs for trials laid down in incomplete blocks (lattice and balanced lattice). Analysis of results of trials with maize**].
Rev. Argent. Agron. 1941 : 8 : 281-316.

The relative efficiencies of simple lattice and balanced lattice designs when compared with randomized complete blocks have been calculated from experiments with four hybrid maize varieties.

688. MARINO, A. E. and LUNA, J. T. 633.15:575"793"(82)
La precocidad de las variedades comerciales de maíces en Santa Fe.
(**The earliness of the commercial varieties of maize in Santa Fe**).
Rev. Argent. Agron. 1943 : 10 : 155-68.

Comparative tests were carried out to ascertain the relative maturation rates of the commercial maize varieties of Santa Fe. Significant intervarietal differences were discovered but are not regarded as of economic importance in this region.

689. RICHEY, F. D. 633.15:575.12
Multiple convergence as a means of augmenting the vigor and yield of inbred lines of corn.
J. Amer. Soc. Agron. 1946 : 38 : 936-40.

A comparison was made between the yields of selfed lines of maize which had been recovered from back-crosses to a recurrent parental inbred, and of crosses between lines back-pollinated to the same recurrent inbred parent and having the same or different non-recurrent parents. The average yield of the three recurrent parental inbred lines was taken as 100%. On this basis the averages for the other groups tested were as follows: 130% for the derived inbreds, 182% for hybrids possessing the same non-recurrent parent, and 191% for crosses having different non-recurrent parents. The practical significance of these results in hybrid production is discussed.

690. SOKOLOV, B. P. 633.15:575.12(47)
(**Maize hybrids, their production and utilization in agriculture**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1946 : Nos 1-2 : 30-45.

In the period 1930-33, tests were made of 241 different crosses of maize varieties in representative parts of the Soviet Union. The results showed that crosses between varieties widely different in time of ripening gave intermediate hybrids; crosses between varieties of similarly ripening time were generally later, though sometimes earlier than the parent. In height the varieties were usually intermediate, though transgression was occasionally observed. The percentage of sterile plants and of lodging was less than the average between the parents. Resistance to some diseases approached the better parent, to others

approached the poorer parent. In yield, 35% of the hybrids exceeded the higher yielding parent and 65% were equal or nearly equal to it; the increase varied usually between 5 and 10%, but in certain isolated cases exceeded 25%. Some combinations yielded less than the parents; 39% of the hybrids exceeded the standard varieties in yield, some of them by up to 25%. The best results were usually obtained in crosses of varieties belonging to different botanical groups, in which at least one of the parents was one of the standard varieties for the locality concerned. The best combinations for a number of different areas in the U.S.S.R. are enumerated. A particularly successful hybrid was Brown County x Gruševskaja, which gave an average yield of 18% more than the standard, Brown County, in the Dnepropetrovsk zone in 1938-40, the difference sometimes amounting to 9.3 centners per ha. and never less than 2 centners. Over 5000 hectares were sown with this hybrid in the Dnepropetrovsk zone in 1940 and 16,700 ha. in 1941.

An outline is given of the method of crossing inbred lines. The Dnepropetrovsk breeding station is one of the few where this method has been applied in the U.S.S.R. In four years' tests, the hybrid Stepnjak, from inbred lines of Brown County x inbred lines of Gruševskaja, gave yields 38.7% greater than Brown County itself. In 1938 Stepnjak yielded 30.5 c. per ha. of air-dry grain, compared with 21.1 c. per ha. from Brown County; the hybrid was also distinguished by resistance to drought, smut and lodging. Another hybrid, Uspeh [Success], from a cross of standard Brown County x inbred line No. 380 of Gruševskaja, has also given good results, with yields of 34 and 35 c. per ha. against 28-29 for Brown County. The single cross hybrid Progress in the north Caucasus has yielded up to 13.4 c. per ha. more than Starling, while ripening two weeks earlier than Leaming.

A great extension of the use of hybrid maize in the U.S.S.R., and the organization of an adequate system of seed production is recommended.

691. HULL, F. H. 633.15:575.125
Overdominance and corn breeding where hybrid seed is not feasible.

J. Amer. Soc. Agron. 1946 : 38 : 1100-03.

A discussion is presented of the relation between yield and the genetical constitution of open-pollinated maize populations in the light of the author's concept of overdominance. It is suggested that the yield of open-pollinated maize might be increased by raising the proportion of heterozygous genes contributing towards heterosis in the population. The following breeding procedure is proposed:—

A number of maize lines are selfed and at the same time crossed to a tester strain which should carry as many double recessive allelomorphic pairs at loci concerned with the expression of heterosis as possible. Next year, the yield performance of the test crosses should be recorded, and in the third year, ear rows should be grown from the 15 selfed lines which gave the highest yields in the test crosses. Crossing between ear rows follows in as many combinations as feasible.

The seed from the latter operation constitutes the incipient new variety and may be subjected to a second three-year breeding cycle with the same or a different tester.

It is important that selection should be for general and not for specific combining ability.

692. MANGELSDORF, P. C. and 633.15:576.16
 REEVES, R. G. 633.15:575.127.5
 L'origine du maïs. (The origin of maize).
 Rev. Bot. Appl. 1940 : 20 : 628-33.

An extended summary is presented of a bulletin by Mangelsdorf and Reeves (cf. *Plant Breeding Abstracts*, Vol. X, Abst. 760).

693. 633.15:576.16(82)
 635.652:576.16(82)
 633.19:576.16(82)

HUNZIKER, A. T.

Granos hallados en el yacimiento arqueológico de Pampa Grande (Salta, Argentina). (Grains discovered in the archaeological site of Pampa Grande, Salta, Argentina).

Rev. Argent. Agron. 1943 : 10 : 146-54.

Descriptions are given of grains of maize, *Phaseolus vulgaris*, *Chenopodium Quinoa*,

Amaranthus caudatus and other unidentified species of *Chenopodium* and *Amaranthus* from a funerary urn in the newly discovered archaeological site at Pampa Grande.

694. SCHELOTTO, B. and MARCHIONI, A. H. 633.15:576.16(87)
 Algunos datos sobre el maíz en Venezuela. Distribución de las variedades botánicas. (**Some data on maize in Venezuela. Distribution of the botanical varieties**).
 Rev. Argent. Agron. 1941 : 8 : 49-56.

Information is presented on the history and present distribution of Venezuelan maize varieties.

695. LOWE, J. and NELSON, O. E. (JUN.) 633.15:581.141:581.143.32:575.11
Miniature seed—a study in the development of a defective caryopsis in maize.
 Genetics 1946 : 31 : 525-33.

Literature on defective embryo and endosperm development in maize is reviewed. Histological and genetical investigations on a defective type of seed, designated miniature seed, are described. The seed is 20% by weight of the normal seed, and although both embryo and endosperm are much reduced they are present in approximately the same ratio as in the normal mature seed. Both corneous starch and an aleurone layer are developed as in normal seed. Normal plants are produced from the miniature seed. Discontinuity of the chalazal layer and the resulting partial starvation of the endosperm and embryo are the cause of this type of defective seed. Disintegration of the chalazal cells begins on the ninth day after pollination and is complete by the seventeenth day. It is suggested, either that the endosperm in the miniature seed is deficient in a substance or substances normally present, or that it produces a substance deleterious to the connecting chalazal cells. The development of miniature seed depends upon a single factor difference, the character being recessive (*mn*) to normal seed and epistatic to the factors for brittle and sugary kernels.

696. OSPITALETCHE, A. E. 633.15:581.4:578.088
 La conservación de la pureza varietal en el maíz. (**The preservation of varietal purity in maize**).
 "Granos" Semilla Selecta, B. Aires 1942 : 6 : Nos 10-12 : 30-33.

A list is given of the various morphological characters which must be watched in order to maintain varietal purity in maize.

697. RICHEY, F. D. 633.15:581.46:581.143.32
Corn cob fur.
 J. Hered. 1946 : 37 : 251-52.

An abnormal "furred" maize cob is described. A single specimen of the abnormality was found in a commercial load of cobs some years ago. In these circumstances it is not possible to know whether the abnormality was due to a genetic or environmental cause.

698. PARODI, L. R. 633.15:582:576.16
 Una nueva especie de Maidea sudamericana del género *Tripsacum*. (**A new species of South American Maydeae of the genus *Tripsacum***).
 Rev. Argent. Agron. 1942 : 9 : p. 249.

The diagnosis of *T. australe* by Cutler and Anderson is reproduced.

699. MCVICKAR, M. H. and SHEAR, G. M. 633.15-1.543
Variations in response of different varieties and hybrids of field corn to planting rate.
 J. Amer. Soc. Agron. 1946 : 38 : 933-35.

The effect of planting rate on three open pollinated varieties and three hybrids of maize was investigated in the 1945 season. The results indicate that the factor of planting rate should be considered in varietal tests, since the maximum yield of different varieties does not necessarily occur at the same planting rate.

700. JENKINS, M. T. and
ROBERT, A. L.

633.15-2.484-1.521.6(75.2)

***Helminthosporium turcicum* leaf blight ratings on corn at Plant Industry Station, Beltsville, Md 1946.**

U.S. Dep. Agric., Agric. Res. Admin. Bur. Pl. Industr. Soils, Agric. Engin. Beltsville, Md 1946 : Pp. 19. (Mimeographed).

Information is given on the reaction of a large number of inbred maize lines, white single crosses and late white double crosses to leaf blight.

701. HOROVITZ, A. and
MARCHIONI, A. H.

633.15-2.7-1.521.6:575.116.1

Herencia de la resistencia a la langosta en el maíz "Amargo". (**Mode of inheritance of the resistance to the locust in the maize Amargo**).

"Granos" Semilla Selecta, B. Aires 1942 : 6 : Nos 10-12 : 37-38.

Amargo maize is resistant to locust (*Schistocerca paranensis* Burm.), and to various other insect pests. Crossing with the susceptible variety Piamontés Klein suggested that resistance is determined by a single incompletely recessive gene, although fewer recessive genotypes than expected segregated in the F_2 .

The gene concerned is designated *ag*; it is not linked to *B b*, *Lg lg*, *Tu tu*, *Pl pl* or *Og og*, but is linked to the genes of chromosome 1, the cross-over value between *P* and *Ag* being 20%. No correlation could be established between locust resistance and any visible morphological character.

702. WALTER, E. V. and
BRUNSON, A. M.

633.15-2.7-1.521.6:575.42

Selection for aphid resistance within inbred lines of maize.

J. Amer. Soc. Agron. 1946 : 38 : 974-77.

A study was made of three maize inbreds, L, 38-11 and Ldg to determine how far continuous selection within an inbred line for susceptibility and resistance to aphid attack (*Aphis maidis* Fitch), is effective in increasing susceptibility or resistance. In the inbred L continuous selection for low infestation reduced susceptibility in comparison with the original strain. In the case of the inbreds Ldg and 38-11, continuous selection for low aphid infestation resulted in little change in resistance in comparison with the original strain. In all three inbreds, selection for a high degree of infestation brought about hardly any appreciable change in susceptibility.

703. ECKHARDT, R. C.,
DOUGLAS, W. A. and
HAMNER, A. L.

633.15.00.14(76.2)

Tests of corn hybrids and varieties in Mississippi 1945.

Bull. Miss. Agric. Exp. Sta. 1946 : No. 427 : Pp. 10.

The results of tests of maize hybrids and open-pollinated varieties at five locations in Mississippi are summarized.

704. GRIEBEN, H. and
DEVOTO, H. A.

633.15.00.14(82)

633.15-2.451.2-1.521.6

Resultado de los ensayos comparativos de rendimiento "standard" entre variedades de maíz, realizados durante el año agrícola 1940/41. (**Result of the comparative "standard" yield trials of maize varieties effected during the agricultural year 1940-41**).

"Granos" Semilla Selecta, B. Aires 1942 : 6 : Nos 7-9 : 6-27.

Data are presented on the yield, length of the vegetative period and resistance to *Ustilago Maydis* of a series of Argentine maize varieties.

705. MARINO, A. E. and
LUNA, J. T.

633.15.00.14(82)

Ensayos de variedades comerciales de maíces y épocas de siembra. (Resultados de 3 años). [**Trials of commercial varieties of maize and times of sowing. (Three years' results)**].

Rev. Argent. Agron. 1942 : 9 : 96-109.

The yields of commercial Argentine maize varieties have been compared when sown at

various dates from September to December. Colorado Klein and Colorado Casilda proved the best each time.

BARLEY 633.16

706. ULLRICH, and
CANEL, M. 633.16:581.143.26.035.1
Über das photoperiodische Wirkungsspektrum bei Isaria-Sommergerste.
(The photoperiodically effective spectrum in the case of Isaria
spring barley).
Naturwissenschaften 1939 : 27 : p. 367.

A line of Isaria spring barley, which genetically, reacts uniformly as regards photoperiodicity, was chosen. The primary leaves of young plants were irradiated with continuous illumination by monochromatic light of various wave lengths, either alone or together with supplementary short-day light. The temperature throughout was 25°. Observation of the development of the growing point 10 to 17 days after the beginning of germination showed that, with intensities of coloured light approximately equal in energy, the maximum effect for flower development is given by green mercury light of wave length 5461 Å and that light of wave length 6152 Å was almost as effective.

Red light with the wave length in the region 6500 to 6900 Å proved ineffective. E. W.

707. 633.16-1.557:581.6:537.531:575.243
GUSTAFSSON, Å. 633.16-2.183-1.521.6:537.531:575.243
633:537.531:575.243

Mutations in agricultural plants.

Hereditas, Lund 1947 : 33 : 1-100.

A valuable and comprehensive review is presented of work done by the author and other investigators in the production of improved varieties of crop plants by means of X-ray induced mutation. The crop that has received most attention is barley, though wheat, oats, flax and a few other crops have been investigated.

Induced mutants are classified as chlorophyll mutants, sterility mutants and viable mutants: the latter are subdivided into morphological and physiological mutants.

The following results are of immediate practical importance. They concern mutants from the three Swedish barleys Maja, Golden and Ymer. Improvements in yield, stiffness of straw, 1000-grain weight and earliness have been obtained in morphological mutants of the bright green or erectoid types. Physiological mutants have been obtained superior in yield to their parents, and having a higher 1000-grain weight, stiffer straw, a shorter life cycle and improved malting quality. One mutant two-row barley derived from Ymer b₇ bears an average of 36-38 fertile spikelets in contrast to the 24-28 spikelets of present commercial strains.

708. SUNESON, C. A. 633.16-2.484-1.521.6:631.557
Effect of barley stripe, *Helminthosporium gramineum* Rab., on
yield.

J. Amer. Soc. Agron. 1946 : 38 : 954-55.

The effect of stripe upon yield was investigated in six F₁ barley hybrids obtained by crossing a susceptible male sterile strain with commercial varieties.

709. 633.16.00.14(41.5)

Report of the seed propagation division, 1945.

J. Dep. Agric., Eire 1946: 43: 74-87.

Barley varietal trials of Spratt-Archer 37 No. 3, Spratt-Archer 37/9 x Golden Archer 2 No. 2 and Beaven's 54/12/3 are reported. Information is also given on the work of propagating pure barley lines.

710. GRIEBEN, H. and
CIPOLLA, G. 633.16.00.14(82)
Resultado de los ensayos comparativos de rendimiento "standard"
entre variedades de cebada cervecera. Años agrícolas 1939/40 a
1941/42. (Results of the comparative "standard" yield trials of
malting barley varieties. Agricultural years 1939/40 to 1941/42).
"Granos" Semilla Selecta, B. Aires 1942 : 6 : Nos 4-6 : 19-31.

Details are given of the yield and the length of the vegetative cycle of the Argentine

malting barleys: Klein Bb 5100, Klein Bb 750, La Previsión 19, Massaux sel. 1 and Michigan 04103.

MILLETS AND SORGHUM 633.17

711. VIGUIER, P. 633.174(66.2)
Les sorghos à grain et leur culture au Soudan français. (**The grain sorghums and their cultivation in the French Sudan**).
Rev. Bot. Appl. 1945 : 25 : 163–222.

Short descriptions are given of many of the large number of sorghum varieties grown in the French Sudan. These are classified into the following species: *Sorghum margaritiferrum*, *S. gambicum*, *S. guineense*, *S. exsertum*, *S. cernuum*, *S. nigericum* and *S. caudatum*. The varietal names and synonyms are those current in the Bambara Bobo-fing, Bobo-oulé, Dogon, Kassonké, Malinké, Marka, Maure, Minianka, Peuhl, Sénoufo and Sonrhaï dialects. The breeding value of this material is indicated.

712. FENNELL, J. L. 633.174:575(72.86)
Grain for tropical America.
Agric. Amer. 1946 : 6 : 202–04.

An account is given of experiments carried out at the Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica, on the practicability of producing grain sorghums under humid tropical conditions. Promising line selections from a cross between Feterita and Shalla have been obtained, giving heavy harvests of good grain. Two of these selections have been named Belleza and Enana, respectively. Belleza usually grows to a height of 6 feet, and has produced 3400 pounds of grain per acre in preliminary trials. Enana grows only about 2½ feet high; it has produced 2500 pounds per acre.

713. 633.174:581.6(78.1)
Starch from grain sorghum.

34th Bienn. Rep. Kans. St. Bd Agric. 1943–1944 (1944) : 134–35.

An account is given of the new waxy sorghum variety Cody, previously known as Waxy Club. In addition to possessing a waxy endosperm, the grain is also free from a water-soluble pigment which usually causes difficulty in processing. The grain and fodder can also be used for animal consumption. It shows some disease resistance, is resistant to lodging and suitable for combine harvesting. It has an unattractive seed colour; this characteristic is, however, useful as a check on the purity of the seed.

RICE 633.18

714. CAÑETE, L. 633.18(72.91)
Instrucciones para las labores de cultivos en los arrozales. (**Instructions for the work of cultivation in the rice fields**).
Rev. Minist. Agric. Cuba 1945 : 28 : No. 2 : 41–47, 50–52.

Information is included on the Cuban rice varieties Fortuna (= Especial, = 7 Estrellas), Rexoro (= Guardia), Nira, Edith, Canilla and Bolo.

715. BRAGADIN, E. A. 633.18(82)
Características agrícolas de las variedades de arroz cultivadas en la República Argentina. (**Agricultural characteristics of the varieties of rice cultivated in the Argentine Republic**).
"Granos" Semilla Selecta, B. Aires 1942 : 6 : Nos 10–12 : 28–29.

Descriptions are given of the agromomic characters of the varieties, Blue Rose, Yamani and Japones Gigante.

716. GERMEK, E. 633.18:575(81)
Métodos de cultura e variedades de arroz. (**Methods of cultivation and varieties of rice**).
Rev. Agric. Piracicaba 1946 : 21 : 264–70.

Short descriptions are given of rice varieties suitable for growing under irrigated or dry conditions in São Paulo. Breeding for the former habitat is being pursued at the Campinas Experimental Station; for the latter at the Experimental Station at Pindorama.

717. OPSOMER, J.-E. 633.18:575.125
Contribution à l'étude de l'hétérosis chez le riz. (**Contribution to the study of heterosis in rice**).
Publ. Inst. Nat. Agron. Congo Belge 1942 : No. 24 : Pp. 30.

A description is given of manifestations of hybrid vigour observed in the progeny of the cross Y3 x Y6. Heterosis was most marked with regard to grain yield.

718. MUSSET, R. and 633.18:576.16:582
MUSSET, L.
Le riz dans le monde. (**Rice throughout the world**).
Rev. Bot. Appl. 1942 : 22 : 151-80, 263-306; 24 : 71-83, 221-82.

This extensive documented review of rice cultivation throughout the world includes information on the origin and history of rice, and on its varieties.

719. PORTÈRES, R. 633.18:576.6:581.46:582
A propos du polyphylétisme d'*Oryza sativa* L. et sur un groupe de variétés de riz cultivées à épillets glabres de cette espèce. (**Concerning the polyphyletic origin of *O. sativa* L. and on a group of cultivated rice varieties with glabrous spikelets belonging to this species**).
Rev. Bot. Appl. 1946 : 26 : 54-57.

The phylogenetic history of *O. sativa* L. is discussed with special reference to its relationship with its putative ancestors. A revised intraspecific classification of *O. sativa* is presented. A list is given of varieties characterized by glabrous spikelets.

720. PORTÈRES, R. 633.18:581.9:575.22(66)
Sur le ségrégation géographique des gènes de l'*Oryza glaberrima* Steudel dans l'Ouest africain et sur les centres de culture de cette espèce. (**The geographical segregation of the genes of *O. glaberrima* Steudel in West Africa and the centres of cultivation of this species**).
C.R. Acad. Sci. Paris 1945 : 221 : 152-53.

More than 300 cultivated varieties of *O. glaberrima* are known from West Africa; these exhibit a wide range of variation parallel to that found in *O. sativa* L., and so exemplify Vavilov's Law of Homologous Variation.

The primary centre of variation of the species is located around the Central Delta of the Niger; a secondary centre of variation occurs at Niore du Rip, half way between Gambia and Timbuktu, while another incipient secondary centre of variation is developing in the mountainous region of French Guinea.

721. GUSTCHIN, G. G. 633.18:582
Ensayos de clasificación botánica de los arroces cultivados (*Oryza sativa* L.). (**An attempted botanical classification of the cultivated forms of rice, *O. sativa* L.**).
"Granos" Semilla Selecta, B. Aires 1942 : 6 : Nos 1-3 : 23-53.

A Spanish translation is presented of an article originally published in French and summarized in *Plant Breeding Abstracts*, Vol. V, Abst. 385.

722. PORTÈRES, R. 633.18:582
Systématique intraspécifique chez *Oryza glaberrima* Steud. (**Intra-specific systematics of *O. glaberrima* Steud.**).
Rev. Bot. Appl. 1946 : 26 : 57-59.

A reclassification of the intraspecific units of *O. glaberrima* is presented.

723. CHILTON, S. J. P. and 633.18 2.484:576.16:631.521.6(73)
TULLIS, E. C.
A new race of *Cercospora oryzae* on rice.
Phytopathology 1946 : 36 : 950-52.

A new race of *Cercospora Oryzae*, designated race 6, is reported on rice in Louisiana and Texas. The reactions of the six differential varieties for races 1-6 are indicated. Information on the reactions of commercial varieties and introductions is also summarized.

Rexoro, resistant to races 1-5 inclusive, is the one variety among the six differential varieties which is susceptible to race 6.

724. JODON, N. E. and CHILTON, S. J. P. 633.18-2.484-1.521.6:575.116.1
Some characters inherited independently of reaction to physiologic races of *Cercospora oryzae* in rice.
 J. Amer. Soc. Agron. 1946 : 38 : 864-72.

Possible linkage relationships between the factors for reaction to physiological races 1, 2, 3 and 4 of *C. Oryzae* and several morphological characters were investigated in 17 crosses. The factor or factors determining reaction to the four physiological races of *C. Oryzae* were found to be inherited independently of the following characters: apiculus colour, plant colour, the colour of the hull furrow, glutinous endosperm, yellow or golden colour of the hull, pubescence of the hull, and leaf pubescence.

Apiculus colour, the colour of the hull furrow and glutinous endosperm were found to be linked characters. The results also indicated a possible linkage relationship between a second factor for apiculus colour and the factor pair for straw or golden coloured hull.

FORAGE GRASSES 633.2

725. CHENG CHUNG-FU 633.2:581.162.52
Self-fertility studies in three species of commercial grasses.
 J. Amer. Soc. Agron. 1946 : 38 : 873-81.

Seed-setting under conditions of open pollination and isolation in parchment bags was studied in clones of *Bromus inermis* Leyss., *Agropyron cristatum* (L.) Beauv., and *Alopecurus pratensis* L. Under both conditions, significant clonal differences in seed setting were recorded. Seed setting under isolation in parchment bags was found to be definitely higher in meadow foxtail than in brome grass and considerably higher than in crested wheat grass. In both brome grass and crested wheat grass it was observed that seed setting under spatial isolation and isolation in pairs of clones was higher than seed setting when parchment bags were used. In the case of brome grass and crested wheat grass, evidence of hereditary differences in seed setting under conditions of open pollination was also obtained.

No consistent relationship between the diameter of the pollen grains and seed setting capacity was found in the clones of the three species. From the data on the clones of brome grass and crested wheat grass, a significant negative correlation was obtained between the percentage of aborted pollen and number of viable seeds produced under conditions of open pollination. In brome grass the percentage of aborted pollen of a clone and the frequency of tetrads with micro-nuclei showed a close relationship; no such association was noted in meadow foxtail.

726. NIELSEN, E. L. 633.21:581.481:576.356.5
Breeding behavior and chromosome numbers in progenies from twin and triplet plants of *Poa pratensis*.
 Bot. Gaz. 1946 : 108 : 26-40.

Information is given on the breeding behaviour of plants derived from polyembryonic seeds of *P. pratensis*. Several modes of origin of twin and triple embryos are indicated, and the data obtained are discussed in relation to the chromosome numbers and highly variable morphology of natural populations.

727. NIELSEN, E. L. 633.21:581.481:576.356.5
The origin of multiple macrogametophytes in *Poa pratensis*.
 Bot. Gaz. 1946 : 108 : 41-50.

The origin of multiple embryos in *P. pratensis* is discussed in detail in relation to histological investigations and the breeding behaviour and chromosome numbers of plants obtained from twin and triple embryos.

728. EVANS, M. and
WILSIE, C. P. 633.262:581.143.26.02(77.7)
Flowering of bromegrass, *Bromus inermis*, in the greenhouse as
influenced by length of day, temperature, and level of fertility.
J. Amer. Soc. Agron. 1946 : 38 : 923-32.

Data are given on the flowering behaviour of early, mid-season and late maturing clones of *B. inermis* under different conditions of day length, temperature and nitrogen level.

729. RAGONESE, A. E. and
MARCÓ, P. R. 633.262:581.466
Observaciones sobre la biología floral de la cebadilla criolla. (**Observations on the floral biology of wild barley**).
Rev. Argent. Agron. 1941 : 8 : 196-99.

Bromus unioloides (Willd.) H.B.K. bears both chasmogamic and cleistogamic flowers. The length of the anthers in the former is 7 mm. and the length of the filaments 4 mm.; in the latter, the respective lengths are .7 mm. and 1.1 mm.

730. RAGONESE, A. E. and
MARCÓ, P. R. 633.262:581.466:581.143.26.035.1
Influencia del fotoperíodo sobre la formación de flores cleistógamas y chasmógamas en cebadilla criolla. (**Influence of photoperiod on the formation of cleistogamic and chasmogamic flowers in wild barley**).
Rev. Argent. Agron. 1943 : 10 : 178-85.

The cleistogamic flowers of *Bromus unioloides* H.B.K. appear to be determined largely by long photoperiod, while chasmogamic flowers appear when the photoperiod is short.

731. ÖSTERGREN, G. 633.284:576.356:575.41
Heterochromatic B-chromosomes in *Anthoxanthum*.
Hereditas, Lund 1947 : 33 : 261-96.

A population of *A. aristatum* from Portugal is characterized by a variable number of heterochromatic B-chromosomes. These do not pair with the main complement and may be either normal chromosomes or isochromosomes. Univalent B-chromosomes are not eliminated at pollen meiosis; they divide into chromatids at meiosis I but disjunction does not occur, and the chromatids pass together into the generative nucleus of the pollen grain. Non-disjunction does not occur in the embryo-sac.

The B-chromosomes appear to have no selective significance to the plant, and it is suggested that they are primarily "useful to themselves" alone, and are in fact parasitic chromosomes, a concept which the author develops with reference to analogous cases from the literature.

732. PARODI, L. R. 633.289:582(82)
Estudio preliminar sobre el género "*Chusquea*" en la Argentina.
(**Preliminary study on the genus *Chusquea* in Argentina**).
Rev. Argent. Agron. 1941 : 8 : 331-45.

Descriptions of two new bamboos, *Ch. deficiens* and *Ch. argentina* are included in this account.

LEGUMINOUS FORAGE PLANTS 633.3

733. SCHIEL, E. and
RAGONESE, A. E. 633.31-2.3-1.521.6:581.192(82)
Infección de la alfalfa con "*Rhizobium meliloti*" en la provincia de Santa Fe. (**Inoculation of lucerne with *Rh. meliloti* in the province of Santa Fe**).
Rev. Argent. Agron. 1942 : 9 : 114-69.

Extensive details are given of the relative nitrogen fixing capabilities of strains of *Rh. meliloti* from Santa Fe, Argentina and elsewhere, when inoculated into lucerne.

734. PALJČEVSKIĀ, A. 633.361(47)
(The Trans-Caucasian sainfoin).

Sovhoznoe Proizvodstvo (State Farming) 1945 : Nos 11-12 : 12-13.

A brief description is given of the Trans-Caucasian form of *Onobrychis sativa*, including data on yields. This legume is an early herbage crop yielding about 140-68 centners of green forage per ha. in pure sowings during the first year of growth. During the second and third years of growth of pure sowings the hay yield of five varieties ranged from 74.5 to 80.7 centners per ha., and during the fourth and fifth years from 91.5 to 94.2 centners per ha.

735. SLATENSEK, J. M. 633.366:581.6:575(78.2)
The occurrence, methods of determination, and inheritance of coumarin in sweetclover, *Melilotus*.

Dep. Agron., Univ. Neb. 1945 : Pp. 7. (Abst.).

Investigations on the non-inheritable causes of variation in the coumarin content of sweet clover and on the inheritance of this character are reported. In addition, the fluorometric and colorimetric methods of coumarin analysis were compared. A method based upon the fluorometric technique, is described, which makes possible the rapid coumarin analysis of a large number of plants. Positive significant correlations were found between the coumarin contents of the first and second years' growth, and between the coumarin contents of inbred parents and their progeny. A highly significant and low correlation was observed between coumarin content and the plant vigour of the first years' growth.

The problem of using *M. dentata* in breeding for coumarin-free sweet clover is briefly discussed. Sweet clover plants with a coumarin content as low as 0.38% were found by the author, using the "mass" fluorometric method described. It is suggested that selection of plants with low coumarin content followed by inbreeding and the production of a synthetic variety offers a valuable method of developing non-toxic sweet clovers.

736. TROLL, H.-J. 633.367-1.531:576.16:581.14
Saatzeitversuche mit Zucht- und Landsorten sowie Wildformen von *Lupinus luteus* und *Lup. angustifolius*. (Experiments on sowing time with pedigree and land varieties and also wild forms of *L. luteus* and *L. angustifolius*).

Pflanzenbau 1940 : 16 : 403-30.

Sowing time experiments were made with different pedigree varieties, land varieties and wild forms of *L. luteus* and *L. angustifolius*.

In the cultivated varieties, there were varietal differences in the length of the stage from sprouting to flowering. In the case of *L. luteus*, a land variety from East Prussia showed the most rapid development, and in the case of *L. angustifolius*, the variety Pflugs Allerfrüheste and an alkaloid-free strain derived from it developed the most quickly. The wild forms of both species from the western Mediterranean area developed very slowly, but a wild form of *L. angustifolius* from the eastern Mediterranean area had the most rapid development of all varieties tested. Differences in the length of the phase from the beginning of flowering to ripening were slight. The individual varieties and lupins from various different sources reacted differently as regards the course of development for different sowing times. In the development of the vegetative organs, the varieties of both species showed differences in their dependence on sowing time. The sowing time experiments also showed differences in behaviour towards virus diseases and in physiological growth disturbances.

The results, therefore, proved that sowing time experiments are a valuable aid in the problems of breeding, not only as regards selection, but also in breeding by hybridization. For example, sowing time experiments are of use in selection work for early ripening under various environments, a problem connected with insensitivity to sowing time. In characterization of physiological and photoperiodic properties of wild forms, sowing time experiments are essential. Again, thereby, not only the geographical relations of plants, but also the connexion between the region of origin and natural selection could be established

E. W.

ROOTS AND TUBERS 633.4

737. BOONSTRA, A. E. H. R. 633.41:581.143
 Rasverschillen bij bieten VI. Het verloop van den groei bij 7 bieten-
 rassen, waaronder voederbieten zoowel als suikerbieten. (**Race differ-
 ences in beets. VI. The course of growth in 7 races of beets,
 both fodder and sugar beets**).

Meded. Inst. Suikerbiet., Bergen-o.-Z. 1942 : No. 2 : 13-95.

In this paper, the sixth of a series on the physiological causes of differences in the yield of various races of beets, the author discusses the advantages and disadvantages of his method in which the whole beet is taken as the experimental unit.

The races used have already been described (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1331).

The problem is discussed under the following heads: (1) description of the pot and field experiments; (2) observations on weight, dry matter content, ash, and nitrogen of various organs; (3) comparison of the function of the various organs, which is the actual object of the whole experiment; (4) the course of the absorption process; (5) water economy, transpiration and the proportion in which ash constituents, or nitrogen and water are taken up; (6) the leaf system; and (7) the leaf root ratio in the young plant.

738. WALKER, J. C. 633.41-2.19-1.521.6
 JOLIVETTE, J. P. and
 HARE, W. W. 633.41-2.19-1.521.6
Varietal susceptibility in garden beets to boron deficiency.
 Soil Sci. 1945 : 59 : 461-64.

Marked intravarietal and intervarietal differences in susceptibility to internal black spot caused by boron deficiency of the soil were observed among several garden beet varieties.

739. EIKELAND, H. J. 633.42-2-1.521.6(48.1)
 Er nepesortane ulikt sterke mot "vattersott"? (**Do varieties of
 turnips differ in resistance to "dropsy"?**)
 Nord. Landbruk 1939 : No. 18.
 [From Nord. JordbrForskn. 1940 : Nos 3-4 : p. 107].

Observations in 1937 and 1938 revealed varietal differences in the resistance of turnips to "dropsy". Østersundom remained unaffected in all six test plots; Kvit Mainepe (Forus) showed 50% injury in one plot but none in the remaining five.

It seems as though the white fleshed turnips are less susceptible than the yellow fleshed ones, e.g. the Trønder swede.

740. CHEVALIER, A. 633.49(6)
 Un légume tropical à répandre: la petite pomme de terre d'Afrique
 (*Coleus rotundifolius*). [**A tropical legume worth spreading: the
 little potato of Africa (*C. rotundifolius*)**].
 Rev. Bot. Appl. 1946 : 26 : 296-300.

Notes are given on *C. rotundifolius* and other tuberiferous species of the same genus.

741. CHEVALIER, A. 633.49:582
 Révision de quelques *Oxalis* utiles ou nuisibles. Répartition géographi-
 que et naturalisation de ces espèces. (**Revision of some useful or
 noxious *Oxalis* species. Geographical distribution and natural-
 ization of these species**).

Rev. Bot. Appl. 1940 : 20 : 657-94.

A taxonomic review is presented of *Oxalis* species of interest to man on account of their economic value or presence as weeds.

742. MEUNISSIER, A. 633.491:575(44)
 Les problèmes de sélection chez la pomme de terre. (**The problems of breeding with regard to the potato**).
 Rev. Bot. Appl. 1941 : 21 : 139-41.

A summary is presented of an article by Meunissier already reviewed in *Plant Breeding Abstracts*, Vol. XIII, Abst. 210.

743. *GLUŠČENKO, I. E. 633.491:575.255:575.3
 (**Genetical differences in quality in tissues of potato**).
 Agrobiologija (Agrobiology) 1946 : No. 1 : 18-50.

Eyes were excised at a depth of 0.5 cm. in 200 tubers of the variety Zarnica [Lichtblick?], and 181 of the cavities gave rise to adventitious buds. From these, 136 plants were obtained, which produced 157 tubers, of which 127 were white, 12 had small coloured patches and 18 were coloured exactly like those of the original variety and the controls. An examination of the first, second and third tuber generations from the white and slightly variegated tubers showed a tendency gradually to revert to the parental, coloured type. Thus the proportion of white tubers in the year of the experiment was 66.6% and this fell to 37% in the third tuber generation. All three types of tuber obtained by treatment were capable of giving any of the three types in their progeny. Thus the white tubers could give rise to coloured tubers and vice versa.

The variety Maika is characterized by very variable tuber colour, the majority of plants having red and yellow patches. From 200 tubers in which the eyes were excised, adventitious buds were produced in 132, and 67 of the resulting plants had white tubers. When deeper incisions were made or the entire skin was removed, a greater proportion of white tubers was obtained but higher losses were incurred. Plants bearing white tubers were also obtained from cuttings taken from coloured tubers. Again the vegetative progeny of the clones behaved differently, but in this variety the tendency was for the proportion of white tubers to increase with each successive generation.

From 500 treated tubers of the red skinned variety Roza Kamersoni, only nine plants with white tubers were produced, but many of the others were either spotted or pink. In the first tuber generation, five out of nine clones reverted to the initial form; two others reverted in the second tuber generation.

A clone of the variety Čugunka with purple and white spotted tubers, when operated on, gave rise to both white and faintly spotted tubers; the latter mostly gave pure white tubers in their vegetative progeny. Similar behaviour was observed in the variety *Solanum tuberosum* f. *latum*, in which, moreover, the second tuber generation contained a number of plants with exceptional vegetative vigour, larger stems and leaves and higher yield than the initial form.

The variety Kostromič, which arose as a vegetative mutant of the variety Imperator, is characterized by crinkled leaves and absence of flowers; it gave rise after operation to two plants with normal leaves and normal flowering.

Tubers of *S. tuberosum* f. *viridabifolium*, which were white with pink ends, were divided into three parts. From the end portions, plants with pink tubers were produced and from the central portion plants with white tubers. These differences were maintained in the tuber progenies of the respective plants.

The starch content in the treated plants was invariably higher than in the controls, corresponding to the higher starch content characteristic of the second, third and fourth layers of cells in the tuber from which they had arisen. The differences were more pronounced in the tuber progenies than in the tubers of the experimental plants themselves. The differences in starch content varied from 1 to 3.6%. At the same time the experimental plants and their progenies were observed to be more vigorous and to bear larger tubers. The differences in the properties of the tissues revealed by these experiments are ascribed to the influence of environment on the tubers during repeated generations of vegetative reproduction. The mere fact that some of the white variants reverted later to coloured forms is thought to exclude the usual explanation of the phenomena as a consequence of

* An extended summary of this paper is on file at the Bureau.

chimerical constitution. The method is regarded as a promising technique for producing improved potato varieties, particularly in view of the increased yield obtained from the experimental plants.

744. H., A. 633.491:575.74(47)
 Les remèdes à la dégénérescence physiologique de la pomme de terre en
 Union soviétique. (**The remedies for the physiological degeneration
 of the potato in the Soviet Union**).
 Rev. Bot. Appl. 1945 : 25 : 237-38.

Reference is made to the views of Lysenko, Efeikin, Orlov and Molotkovskii on the causes of potato degeneration under hot dry conditions.

745. YARWOOD, C. E. 633.491:581.143.26(79.4)
Increased yield and disease resistance of giant hill potatoes.
 Amer. Potato J. 1946 : 23 : 352-69.

Late maturing bolter plants of the Netted Gem potato variety grown in the San Juan district of California have shown a relative freedom from infection by *Verticillium albo-atrum* and *Rhizoctonia* in comparison with normal plants. Normal plants are usually dead 90-100 days after planting, whereas the bolters have lived up to 136 days, and yielded 63% greater weight of tubers than the normal plants, 123-136 days after planting. Tubers from the bolter plants have the disadvantageous characters of larger size, deeper eyes, greater frequency of overgrowths, and tendency to be spindle shaped. The bolters also differ from normal Netted Gem plants in several other characters, such as decreased susceptibility to early and late blight, smaller yield of tubers during the first 90 days after planting, indeterminate haulm growth, and longer dormancy of the tubers. The different bolter families showed significant variations in most of the characters investigated.

746. STELZNER, G. and
 PROHL, C. 633.491:581.192:575:578.08
 Der Einfluss später zusätzlicher Stickstoffdüngung auf Eiweissgehalt
 und Eiweissertrag der Kartoffel. (**The effect of late additional
 nitrogen manuring on the protein content and protein yield in the
 potato**).
 Pflanzenbau 1944 : 20 : 129-36.

The correlation between crude and pure protein is so wide and variable that breeding problems can only be formulated on the basis of the pure protein. E. W.

747. CALDWELL, J. S.,
 BRUNSTETTER, B. C.,
 CULPEPPER, C. W. and
 EZELL, B. D. 633.491:581.6
**Causes and control of discoloration in dehydration of white
 potatoes.**
 Canner 1945 : 100 : No. 13 : 35-39, 112, 114, 118, 120, 122; No. 14 : 15-16,
 18, 30-32, 34; 15 : 14, 16, 24, 26-27.

Literature on the causes and control of discoloration in dehydrated potatoes is reviewed; reference to varietal tendency to blacken is included.

748. BLODGETT, F. M. and
 STEVENSON, F. J. 633.491-2.3-1.521.6:575(73)
The new scab-resistant potatoes, Ontario, Seneca and Cayuga.
 Amer. Potato J. 1946 : 23 : 315-29.

The national potato breeding programme begun in the United States about 15 years ago has included breeding for scab resistance as one of its objectives. Four new promising high-yielding seedlings have been produced. In addition to their scab resistance, these seedlings show more resistance to late blight and *Fusarium Solani* (Mart.) App et Wr. var. *Eumartii* (Carp.) Wr. than the majority of commercial potatoes. Seedling U.S.D.A. 528-118 has been named Menominee (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1047). Seedlings 528-242, 627-235 and 627-126 have been named Ontario, Seneca and Cayuga, respectively; detailed accounts of these varieties are given in the present paper.

Ontario is a selection of a cross between Richter's Jubel and U.S.D.A. Seedling 44537. Seneca and Cayuga have been derived from a cross between Hindenburg and Katahdin. A report is given of the results of trials of the four new seedlings in New York State, in comparison with standard varieties. Data are included on total yield, yield of No. 1 grade tubers, resistance to scab and *Fusarium Solani* var. *Eumartii* and other characteristics. The preliminary data indicate that Ontario, Seneca and Cayuga cannot be recommended unreservedly, and it is hoped to eliminate their undesirable characters by further breeding and selection; it is however suggested that these varieties will be of temporary value in areas heavily infected with scab.

749. RIEDL, W. A.,
STEVENSON, F. J. and
BONDE, R. 633.491-2.3-1.521.6:575(73)
The Teton potato: a new variety resistant to ring rot.
Amer. Potato J. 1946: 23: 379-89.

The new potato variety, Teton, is described in detail. It has been developed from a cross between Earline and U.S.D.A. Seedling No. 45146, and in tests in Maine and Wyoming it has shown a high degree of resistance to ring rot [*Corynebacterium sepedonicum* (Spieck. et Kotth.) Skapt.]; it is not, however, immune to the disease. Teton is high yielding, and its cooking quality is good.

750. CATES, J. S. 633.491-2.411.4-1.521.6:575(73)
New blight-immune potatoes.
Co. Gent. 1945: 17, 67.

An account is given of breeding for late blight resistance in the national potato breeding programme of the United States. In addition to the blight resistant Sebago variety, released in 1938, the promising blight resistant seedlings, B 70 5 and B 76-43, have recently been developed.

751. CLARK, C. F. 633.491-2.411.4-1.521.6:575(73)
The Calrose potato: a new variety possessing resistance to late blight.
Amer. Potato J. 1946: 23: 343-47.

The new Calrose potato is described (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 813). The variety has been developed from the cross Ackersegen x Katahdin by the United States Department of Agriculture. The tubers are long, smooth, shallow-eyed, and regular in outline. The tubers have been classed as medium in dryness when cooked, with slightly waxy consistency; the flavour is described as good. Calrose is moderately resistant to late blight. Full information on its reaction to other diseases is not at present available. The chief tests of the variety have been carried out in California, where it appears to be well-adapted to conditions in several districts. Calrose requires a relatively long growth period; it should therefore be useful in supplementing other varieties.

752. JØRSTAD, I. 633.491-2.412.5-1.521.6(48.1)
Potetkreftens utbredelse i Norge og fortegnelse over potetsorter prøvd
mot kreft. (The extent of potato wart disease in Norway and a
list of varieties of potatoes tested for resistance).
Meld. Skadeinsekter Plantesykdommer, Oslo 1938 (1940): Pp. C 56.

A comprehensive and detailed official report is given of (1) the incidence in Norway of wart disease during a long period of years and (2) the results of wart resistance trials in which Norwegian, English, American, German and other varieties took part. The literature cited dates from 1903 to 1939.

753. LECLERG, E. L. 633.491-2.484-1.521.6:575(76.3)
Breeding for resistance to early blight in the Irish potato.
Phytopathology 1946: 36: 1011-15.

Tests of the reaction of 19 commercial potato varieties and 445 seedling varieties to early blight [*Alternaria Solani* (Ellis et G. Martin), L. R. Jones et Grout] were made under field

conditions in Louisiana. Of the commercial varieties investigated, only Menominee exhibited any marked degree of resistance. The data obtained indicated that several promising early blight resistant seedlings are available for future breeding work.

754. MARANI, M.,
GOIA, G. and
ROSSI, L. 633.491.00.14(45)
Prova d'orientamento di varietà di patate. (**Preliminary test of
potato varieties**).
Riv. Frutticolt. 1943 : 7 : 98-99.

In tests of seven varieties, with Tonda di Berlino [Boehms Allerfrüheste Gelbe] as standard, Viola was the only variety which exceeded the standard in both yield and earliness. The highest yield of all was given by Flava.

755. EDMOND, J. B. and
MARTIN J. A. (JUN.) 633.492-1.521.12(75.7)
**The flowering and fruiting of the sweet potato under greenhouse
conditions.**
Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 391-99.

An account is given of the methods used at the Clemson Agricultural College, South Carolina, to produce seed of the sweet potato under greenhouse conditions.

FIBRES 633.5

756. WELCH, F. J. 633.51:575(73)
The current cotton research program in production and related fields.
Miss. Agric. Exp. Sta. 1945 : Pp. 103. (Mimeographed).

This report summarizes the results of a survey of current investigations in the United States relating to cotton production and the preparation and distribution of the raw product. The publication covers the work of the state agricultural experiment stations, the United States Department of Agriculture, the War Food Administration, the National Cotton Council of America, and the Clayton Foundation. Of particular interest are the sections on (1) the breeding, genetics and improvement of cotton varieties; (2) varietal testing and the geographical distribution of varieties; (3) the genetic, technical and economic aspects of cotton seed production; (4) disease control; and (5) fibre qualities and the objectives of breeding in this connexion.

757. 633.51:575(76.1)
**54th and 55th Annual Reports of the Agricultural Experiment
Station, Alabama Polytechnic Institute January 1, 1943—
December 31, 1944 : Pp. 39.**

The work of improving the Cook 144, Stoneville, Deltapine, Miller and Coker 100 Wilt cotton varieties by intravarietal selection and intervarietal selection and intervarietal hybridization was continued. A new strain developed from the cross Stoneville x Cleve-wilt, designated Auburn Hybrid 9531, was increased for limited distribution. In trials during the last three years this strain has given satisfactory results in yield, staple length and wilt resistance; its staple length is one inch or over.

758. MAKSIMENKO, N. K. 633.51:575.061.6
(Cotton with naturally-coloured fibre).
Agrobiologija (Agrobiology) 1946 : No. 1 : 107-22.

Out of 2000 families of hybrids examined in the autumn of 1939, only 24 plants, resulting from four interspecific combinations, were found to carry bolls with fibre tinted green. Three of the combinations bore evidence that *Gossypium purpureum* was included in their ancestry; the ancestors of the fourth combination included Pima, *G. hirsutum* and *G. barbadense*.

The purpose of the investigations described was to breed cottons of various colours. During successive generations originating from the 24 plants mentioned above, shades of blue, buff, yellow, and pinkish-yellow, as well as green, emerged in some of the cotton bolls.

These and other characters came into being from time to time, and the author could not account for them on Mendelian principles.

A decrease in vigour occurred in the F_2 generation, but under the influence of external conditions and unrestricted pollination, a recovery was effected. Strains of cotton then emerged in which the colours became faster and deeper, and the technological quality of the fibres approaching normal standards.

The chemical properties of the colours are being investigated.

I. Z.

759. VARUNCJAN, I.

633.51:581.04:576.356.5

(Artificial polyploidy in cotton).

Agrobiologija (Agrobiology) 1946 : No. 1 : 148-57.

Among the numerous attempts to create new varieties by multiplying the numbers of chromosomes and restoring fertility in sterile hybrids, techniques involving the use of colchicine have been very frequently used. It is stated in this article that crossings between difference species of cotton with either the same or different numbers of chromosomes have failed, even with the aid of colchicine, to produce true-breeding, fertile and vigorous hybrids. Such hybrids as have been produced are regarded as worthless, and as offering little promise of possible improvement; they are usually sterile, or soon become so, and are late in development.

It has been suggested by some Russian investigators that it is not so much cytological as physiological causes which make the hybrids so ill-adapted to their surroundings. It is believed that certain cultivated cottons having 52 chromosomes have originated in the crossing of two 26-chromosome species, one from the New World and the other from the Old, with subsequent doubling of the chromosome number. Attempts to reproduce the existing cultivated cottons artificially have failed.

I. Z.

760.

633.51-2.484-1.521.6

MARCHIONATTO, J. B.

634.975-2.484-1.521.6

Ensayos de laboratorio con el "*Fusarium vasinfectum*". (Laboratory trials with *F. vasinfectum*).

Minist. Agric. Nac. Direcc. Gen. Invest. Inst. Sanid. Veg., B. Aires 1946 : 2 : Ser. A : No. 22 : Pp. 7.

Strains of *F. vasinfectum* have shown diminution of pathogenicity after several years in culture. They were tested by inoculation into cotton and *Pinus halepensis*.

761. CHARTON, R. O. and

ROBERTY, G.

633.51.00.14(67.2)

Le cotonnier dans la colonie du Tchad. (Cotton in the colony of Chad).

Rev. Bot. Appl. 1946 : 26 : 300-04.

The performance at Chad of the two varieties Allen and N'Kourala is described. Both are Upland cottons selected from American material.

762. NEELY, J. W. and

BRAIN, S. G.

633.51.00.14(76.2)

Studies with recently developed cotton strains in the Yazoo-Mississippi Delta, 1943.

Circ. Miss. Agric. Exp. Sta. 1944 : No. 121 : Pp. 8.

A report is given of tests of new strains of Delfos, Stoneville, Bobshaw and other cotton varieties in comparison with commercial strains.

763. TARIMAN, M. C.

633.52:575.42(56)

Türkiye ketenlerinin morfolojik ve teknolojik vasıfları ve bunlardan faydalanma imkânları. (Morphological and technological characteristics of Turkish flaxes and possibility of their utilization).

T. C. Yüksek Ziraat Enstitüsü Basımevi, Ankara 1944 : No. 145 : Pp. 108.

After a general section on the uses, origin, distribution and present position in Turkey of both fibre and oil flax, a short history is given of the development of flax cultivation. Much attention is devoted to the difficult problem of the classification of Turkish and other cultivated flaxes.

Numerous tables show the yield of stems and seed and proportionate weight of roots of the main Turkish varieties, which are, however, indicated only by numbers.

The 1000 seed weight of Turkish flaxes varies between 3.5 and 9.9 grm. Judging from this, they could be grouped either as fibre or oil varieties, but technological and morphological characters show that among the hitherto established varieties there are none of purely fibre type. Possibly a greater abundance of fibre varieties might be found among those of the Black Sea coastal region. The majority of Turkish flaxes may be counted as intermediate between oil and fibre types.

Stem and seed yield of Turkish flaxes is good, and oil content compares favourably with that of other countries. Under favourable cultural conditions there are varieties that yield 600–700 kg. of stem and 300–325 kg. of seed. Both winter and summer varieties exist. Summer varieties cannot withstand the cold, and, while some of the winter varieties will not bear seed when sown in the summer, others can be sown either in autumn or spring.

There are in Turkey flax varieties suitable for growing in both northern and western coastal regions and in Central Anatolia. By mass and individual selection, varieties might be obtained with characteristics to suit all these regions. Good fibre flaxes can be grown in the coastal regions. Varieties of fibre flax could be obtained by selection from Turkish varieties, or by choosing suitable strains of foreign varieties with features which it would be desirable to breed into Turkish flaxes.

764. 633.52:576.16

HAAN, H. DE

633.52:575

Ontstaan en veredeling van het vlas. (**The origin and breeding of flax.**)

Cultivator Algem. Bond Oudleerl. Inricht. Middelbaar Landbouwonderwijs, Wageningen 1943: Pp. 15.

An informative historical survey is given of (1) the botanical species of flax and the origin of cultivated flax and its forms and land races, (2) the beginning of flax breeding by mass selection and the isolation of lines from land races, (3) hybridization to obtain breeding material, and (4) flax breeding in different countries.

Other points treated are: the time required for the production of a new variety by line selection; the maintenance of races; and the role of the official and of the private grower in various countries.

Modern breeding methods are also reviewed.

765. 633.52:576.16:582

CHEVALIER, A.

633.522:576.16:582

Histoire de deux plantes cultivées d'importance primordiale. Le lin et le chanvre. (**History of two cultivated plants of primordial importance. Flax and hemp.**)

Rev. Bot. Appl. 1944: 24: 51–71.

An account is given of the history and botanical varieties of flax and hemp.

766. KUGLER, W. 633.52:578.08:575(82)

Obtención de dos cosechas por año de multiplicaciones de lino, en la Argentina. (**Obtaining two harvests a year of flax undergoing multiplication in Argentina.**)

Rev. Argent. Agron. 1941: 8: p. 261.

By organizing a co-operative scheme between research stations at different latitudes, it has been found possible to multiply flax varieties in Argentina at a rate of two generations a year.

767. FLOR, H. H. 633.52–2.452:576.16:631.521.6:575.11

Genetics of pathogenicity in *Melampsora lini*.

J. Agric. Res. 1946: 73: 335–57.

The mode of inheritance of pathogenicity in *M. Lini* (Pers.) Lév. was studied by determining the reaction of 15 differential varieties of flax to F₂ cultures of hybrids between

physiological races 6 and 22 and between races 24 and 22. Race 22 is South American in origin; races 6 and 24 are from North America.

The following differential varieties were investigated: Buda, Williston Golden, Williston Brown, Akmolinsk, Abyssinian, Leona, Pale Blue Crimped, Kenya, Ottawa 770B, Bombay, Newland, Tammes Pale Blue, Bolley Golden, Italia Roma, Morye and J.W.S. The results indicate that at least 19 distinct pairs of genes conditioning rust reaction are distributed among the 16 varieties studied. The conclusion was also reached that for each pair of factors conditioning rust reaction in the host, there is a corresponding pathogenic pair in the rust fungus, the pathogenicity of each race depending upon its content of dominant or recessive factors for virulence. Variations in virulence of the pathogen on the differential varieties tested are explained by assuming 18 factors for pathogenicity occurring in 12 independently inherited groups. The significance of these results in breeding for resistance is discussed.

768. NASCIMENTO FILHO, A. C. 633.524.3:576.312.35
Os cromosomios do genero Sida. (**The chromosomes of the genus *Sida***).

Bol. Soc. Brasil. Agron. Rio de J. 1941 : 4 : 67-71.

The chromosome complements of *S. tuberculata* var. *pseudorhombifolia* and *S. rhombifolia* var. *canariensis* are described and figured. There are 32 diploid chromosomes in the former and 16 in the latter.

769. CHEVALIER, A. 633.524.35
635.648
L'origine, la culture et les usages de cinq *Hibiscus* de la section *Abelmoschus*. (**The origin, cultivation and uses of five *Hibiscus* species of the section *Abelmoschus***).

Rev. Bot. Appl. 1940 : 20 : 319-28, 402-19.

The taxonomy, distribution, cultivation and economic uses of *H. ficulneus* L., *H. Manihot* L., *H. esculentus* L., *H. Abelmoschus* L. and *H. hispidissimus* Chev. are described. Vernacular names of these various species are listed and notes are added on the following varieties: (1) of *H. esculentus*, Gombo à Fruit Long, Gombo Nain, Gombo à Fruit Rond, Sultani Hâtif from the Mediterranean region, Gouan Né and Gouan Ba from French Guinea, Gona and Yoga from central Africa, Gouanlé, Gouan, Nougou, Ntourigouan and Gouan Ba (Gouama) from west Africa, Gandié (probably the same as Gouanlé), Toré Gan and Tri Ba Gan from the French Sudan, Gouangan (= Mana, = Pori) and Ntorigouna (= Gamba Mané, = Pogo Foha) from Mossi, Issa Mani, Farimani, Dapo Mani and Foré Mani from Gourma, Cégouan, Gouan Oulé and Mogo Gouan from the Ivory Coast, Soundé (= Gouan Mésé) from Baoulé, and Févi Hisso (= Ila) and Mana from Dahomey; and (2) of *H. Abelmoschus*, Gouan Suma Duma, Lana Kangué, Sounka Kanyo and Suma Yala from the French Sudan, Kosommié (= Suma Yala) from the Guinea coast, and Kongomé from Baoulé.

770. LOPES, J. P. 633.526.2:576.356.5
Sôbre a cariologia da secção *Coarctatae* Berger do género *Haworthia* Duval. (**The Caryology of the section *Coarcticae* Berger of the genus *Haworthia* Duval**).

Agron. Lusitana 1944 : 6 : 129-212.

This is a further contribution to the study of the Aloinae referred to in *Plant Breeding Abstracts*, Vol. XIII, Abst. 1160 and Vol. XIV, Abst. 922. The section contains a natural polyploid series of $2x$, $3x$, $4x$, $5x$, $5x + 1$ and $6x$ forms. Chromosomal agglutination was observed in almost all species.

Observations were made also on pollen tube germination. The cytological differences are not clearly related to morphological differences, and do not seem capable of being used for purposes of systematics.

771. CAMARGO, F. C. 633.526.5:582:575
 Vida e utilidade das Bromeliáceas. (**Biology and utility of the Bromeliaceae**).

Bol. Téc. Inst. Agron. Norte, Brasil 1943 : No. 1 : Pp. 31.

This illustrated taxonomic account deals with the following forms: *Neoglaziovia variegata*, *Ananas erectifolius*, *A. microstachys*, *A. microstachys* var. *nanus*, *A. comosus*, *A. Fritzmuelleri*, *Pseudananas sagenarius* and *Ps. sagenarius* var. *macrodontes*. Brief references are made to past breeding work and future possibilities.

772. FANG, W. P. 633.584.3:582(51)
A new species of *Salix* from Szechwan.

J. W. China Border Res. Soc. 1945 : 15 : Ser. B : 178-80.

The new species, *S. Hoana* Fang, is described. It is placed near *S. cheilophylla*, from which it is distinguished by a cylindrical ventral nectary, the dark bracts of both the male and female flowers, and the glabrous branches of the shrub.

SUGAR PLANTS 633.6

773. BORDEN, R. J. 633.61-1.84(96.9)
Variety differences in nitrogen utilization.
 Hawaii. Plant. Rec. 1946 : 50 : 39-49.

The reaction of the three sugar cane varieties, H 109, 32-8560 and 35-1515, to different levels of nitrogen fertilizer was investigated. Intervarietal differences were observed in the response to a given nitrogen level. Significant interactions between variety and nitrogen supply were obtained for the following determinations: green weight of millable stalks, dry weight of stalks, nitrogen percentage in juice, juice purity, recoverable sugar, total nitrogen in stalks, dry weight of tops and trash, nitrogen percentage in tops and trash, total nitrogen in tops and trash, total nitrogen in roots and stubble, total dry weight of entire crops, and the total nitrogen content recovered from the whole crop. The variety 32-8560 produced the highest sugar yield at a medium or average nitrogen level.

774. PUERTAS, R. P. 633.61.00.14(72.91)
M-L-3-18 cane and its practical results.

Proc. 19th Mtg. Asoc. Técn. Azucareros Cuba 1945 : 81-91.

The results of field and industrial trials of the Media Luna 3-18 sugar cane are summarized. M-L-3-18 has been produced from a cross between P.O.J. 2878 and S.C. 12-4. If provided with appropriate soil the variety is considered as suitable to replace P.O.J. 2878. It suckers profusely and makes good growth. It yields a heavy tonnage in the field, and produces 10-15% more juice per unit of weight than other varieties cultivated in Cuba. The fibre content of the cane is low and the juice quality good. The variety is disease resistant but susceptible to borer attack.

775. AVANZI, E. 633.62:575(45)
 Cenni sui primi risultati della selezione del sorgo zuccherino. (**Notes on the first results of selection in sweet sorghum**).
 Ann. Fac. Agrar. Univ. Pisa 1942 : 5 : (N.S.) : 198-207.

Breeding work with sweet sorghum was started in 1937. Selections were made according to the "index number," which is the product of average weight of cane (without leaves and panicle) and the average brix value, though no plants with a brix value below a certain minimum were selected. In 1940 and 1941 eight selections of the variety Waconia Orange and eight of the variety X-11-21 were under observation. The brix values varied between 20 and 25 and all the selections had cane weights of over 800 grm.

776. YAKUSHKIN, I. 633.63:575(47)
Selection and seed-raising.

Agricultural Chron., Moscow 1946 : No. 4 : p. 1. (Mimeographed).

A brief account is given of the new sugar beet variety, Ramonsky 1537, bred by A. Mazlumov. R-1537 produces outstanding crop and sugar yields. The related variety R-306 has also given good results in tests during 1944 and 1945.

777. *SANOCKAJA, E. I. 633.63:581.143.26:575(47)
(Breeding sugar beet in new sugar beet growing regions).
 Naučnyĭ Otčet Vsesojuznogo Naučno-Issled. Inst. Sveklovičnogo
 Polevodstva za 1941–1942 gg. (Sci. Rep. All-Union Res. Inst. Sugar
 Beet Husbandry for 1941–42) 1945 : 86–101.

Sugar beet varieties bred in the Ukraine have often been found to give better yields in other areas than varieties produced locally. This is thought to be largely because breeders have always attempted to produce varieties of the universal type and have paid insufficient attention to the special ecological and other peculiarities of the newer sugar beet growing areas. Studies were made on a number of plants of two varieties under conditions of defective and of excessive watering. Observations made throughout the growing season showed that the plants in variety I 1530 can be divided into five classes, viz. (1) a type with very intensive growth of root and tops during the whole vegetation period; (2) a form distinguished from (1) by a somewhat lower intensity of growth of root and tops, though equal in leaf development; (3) a form characterized by irregular growth which proceeds in "jumps" and occurs mainly in July; (4) a form characterized by intense growth of the tops in the first growing period, loss of roots in the second half of the vegetation period and root growth rapid at the beginning but retarded from the end of July to the beginning of August; and (5) a form distinguished by reduced growth of tops and root, and in which leaf formation and increase in leaf surface and root surface are slow during the entire vegetation period.

In variety R 1537, a sixth type appeared, in which the energy of growth was reduced in the early phases of development and became more vigorous in the later phases; a seventh type in this variety was characterized by excessive leaf formation and low yield. Variety R 1537 yields better under high farming conditions with irrigation, but in both varieties the number of types corresponding to the type of irrigation applied in practice was extremely small. The immediate task before the investigator is to alter the percentage representation of the various types and to arrive at a suitable system of irrigation, so as to give the maximum results of which the varieties are capable.

778. CHEVALIER, A. 633.63:581.6:575.12:007
 L'Abbé Henri Colin (1880/1943). [The Abbe Henri Colin
 (1880/1943)].
 Rev. Bot. Appl. 1943 : 23 : 70–73.

This obituary notice includes a reference to Colin's researches on the genetics of sugar content in sugar beet hybrids.

779. CORREIA, F. A. and 633.682:581.6(81)
 FRAGA JÚNIOR, C. G.
 Tecnologia da mandioca. (**Technology of manioc**).
 Bragantia, São Paulo 1945 : 5 : 213–26.

Information is presented on the starch and dry matter content of manioc varieties in São Paulo, also on the relation of these to each other and to other factors.

780. CROIZAT, L. 633.682:582:001.4
Manihot Tweediana Mueller is unacceptable.
 Rev. Argent. Agron. 1944 : 11 : 173–74.

The name *M. Tweediana* is rejected as a later synonym of *M. Grahami* Hook.

781. NORMANHA, E. S., 633.682–2.8–1.521.6(81)
 BROOCK, O. J. and
 CASTRO, J. B. de
 Observações de campo como contribuição ao estudo do superbrotamento
 ou envassouramento da mandioca. (**Field observations contributing
 to the study of excessive proliferation or witches' broom of
 manioc**).

Rev. Agric. Piracicaba 1946 : 21 : 271–302.

Varietal resistance of manioc to a recently reported disease termed excessive proliferation,

* An extended summary of this paper is on file at the Bureau.

probably caused by a virus, has been investigated. The following varieties proved most resistant: No. 50 Pai Quinto, No. 59 Branca de Santa Catarina, No. 60 Preta, No. 96 Orandí, No. 108 Holandí Itaguaú and No. 192 Itú.

782. HAUDRICOURT, A. 633.689:582
Les Colocasiées alimentaires (taros et yautias). [**Edible Colocasieae**
(**taros and yautias**)].
Rev. Bot. Appl. 1941 : 21 : 40-65.

A taxonomic review is presented of edible species of *Xanthosoma*, *Alocasia* and *Colocasia*. Vernacular names of the various species and local varieties are included.

STIMULANTS 633.7

783. 633.71:061.6(45)
633.71:575(45)
Istituto Scientifico Sperimentale per i Tabacchi. (**The Tobacco**
Research Institute).
Tabacco 1946 : 50 : No. 567 : p. 2.

An outline is given of the proposed activities of the Tobacco Research Institute in Italy, which has latterly been in a state of suspension. The new activities pay special attention to breeding and selection.

784. DUFRÉNOY, J. 633.71:576.354.4:575.127.2
Etudes génétiques sur le tabac en France. (**Genetical studies on**
tobacco in France).
Chronica Botanica 1942 : 7 : 277-78.

Nicotiana Tabacum var. *purpurea* and *N. silvestris* have been crossed at the Institut Expérimental des Tabacs and the progeny maintained till the F_{15} generation. The cytology and general characteristics of the hybrid progeny are described. It has been found possible to recover types closely resembling either of the original parents.

785. NOVIKOFF, V. 633.71:581.6(61.1)
Essais d'amélioration de la combustibilité des tabacs tunisiens.
(**Attempts to improve the combustibility of Tunisian tobaccos**).
Ann. Serv. Bot. Tunis. 1941 : 18 : 211-54.

Small varietal differences in the combustibility of Tunisian tobaccos are recorded, but these are in general too slight to be of any importance.

786. GOODSPEED, T. H. 633.71:582
A fourth new species of *Nicotiana* from Peru.
Univ. Calif. Publ. Bot. 1941 : 18 : 195-204.

A new species of *Nicotiana* from Peru is described, *N. Setchelli*. The new species is discussed in relation to the *Nicotiana* spp. belonging to the *tomentosa* group, with which it shows many affinities.

787. WELLENSIEK, S. J. 633.72:575:578.08
De veredeling van de theeplant. (**The breeding of the tea plant**).
Grondslagen Algemeene Plantenveredeling, Haarlem 1943 : 305-47.

This is a separate printing of the section on tea breeding and selection in the author's textbook on the principles of plant breeding which was reviewed in *Plant Breeding Abstracts*, Vol. XVI, p. 365.

788. KRUG, C. A. 633.73:575.12(81)
Melhoramento do cafeeiro. (**Improvement of coffee**).
Bol. Superintend. Serv. Café, São Paulo 1945 : 20 : 979-92.

Continuing his account of coffee breeding in São Paulo (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1854), the author describes the work that has been done in selecting improved strains of *Coffea arabica* varieties. Both the selected plants and their progenies have been subjected to regional trials.

Experiments on intravarietal hybridization have shown that crossing between members of the same variety results in heterotic offspring; conversely, selfing is deleterious.

Attempts have been made to improve the yield of Maragogipe by crossing with such varieties as Bourbon and Nacional. It is hoped to improve other varieties by intervarietal hybridization.

Quite new types have been obtained by crossing the following forms: Maragogipe x Mokka, Maragogipe x Laurina and Mokka x Laurina.

Interspecific hybrids have been obtained from *C. arabica* x *C. canephora* and tetraploid *C. Dewevrei* var. *excelsa* x *C. arabica*. Methods of reproducing valuable sterile hybrids vegetatively are being considered.

789. LEBRUN, J. 633.73:576.312.35:582(67.5)
Recherches morphologiques et systématiques sur les caféiers du Congo.
(**Morphological and systematic researches on the coffee trees of the Congo**).

Publ. Inst. Nat. Agron. Congo Belge 1941 : Pp. 183.

The first part of this monograph is concerned with an investigation into the cytology of *Coffea* spp., all of which excepting one cultivated specimen of *C. stenophylla* proved to have 22 diploid chromosomes. The chromosome configuration of the species investigated appeared to be very uniform.

The second part of the monograph deals with the morphology and taxonomy of *Argocoffea*, *Argocoffeopsis* nov. gen., *Calycosiphonia* and the following species of *Coffea*: *C. eugenioides*, *C. kivuensis*, *C. congensis*, *C. arabica*, *C. canephora*, *C. brevipes* and *C. liberica*. There are nineteen plates.

790. CARVALHO, A. 633.73:582
Distribuição geográfica e classificação botânica do gênero *Coffea* com referência especial à espécie *arabica*. ((**Geographical distribution and botanical classification of the genus *Coffea* with special reference to the species *arabica***)).

Bol. Superintend. Serv. Café, São Paulo 1945 : 20 : 1138-46; 1946 : 21 : 6-10, 69-73, 127-30, 174-84.

A taxonomic review is presented of the genus *Coffea*, based largely on the series of papers by Chevalier already reviewed in *Plant Breeding Abstracts*. The species principally considered are *C. liberica*, *C. congensis*, *C. canephora*, *C. Dewevrei* and in particular *C. arabica*. Maps showing the distribution of the various forms are included.

791. CHEVALIER, A. 633.73:582
Le statut actuel du genre *Coffea* L. (**The present status of the genus *Coffea* L.**).

Rev. Bot. Appl. 1942 : 22 : 129-50.

With reference to a recent publication by de Wildeman on the taxonomy of the genus *Coffea*, the author considers the typification of the genus, and the status of several of the published species, microspecies, hybrids and mutants.

792. CHEVALIER, A. 633.73:582(67)
Note sur les caféiers sauvages de l'Afrique austro-orientale. (**Note on the wild coffee trees of south-eastern Africa**).

Rev. Bot. Appl. 1940 : 20 : 529-40.

The taxonomy of *Coffea* species indigenous to south-eastern Africa is discussed.

793. CHEVALIER, A. 633.73:582:575(66.2)
Les problèmes de la caféiculture dans les colonies françaises. (**The problems of coffee cultivation in the French colonies**).

Rev. Bot. Appl. 1940 : 20 : 229-51.

This review includes a taxonomic revision of the genus *Coffea*, and indicates lines along which breeding work might be profitable.

794. CARLETO, G. M. 633.74:581.162.3:578.08
A polonização controlada na flor do cacauero. (**Controlled pollination in the flower of the cacao tree**).

Bol. Téc. Inst. Cacao, Bahia 1946 : No. 6 : Pp. 39.

The technique of self and cross pollination in *Cacao* is described.

795. CHEVALIER, A. 633.74:582:001.4
Révision du genre *Theobroma* d'après l'herbier du Muséum national d'Histoire naturelle de Paris. (**Revision of the genus *Theobroma* from the herbarium of the National Museum of Natural History at Paris**).

Rev. Bot. Appl. 1946 : 26 : 265–85.

This taxonomic monograph includes figures and descriptions of all the species of *Theobroma* (excl. *Herrania* Goudot) recognized by the author, viz. *T. Cacao* L. [incl. the five Jordanian species *T. sativa* (Lam.) Lignier et le Bey, *T. leiocarpa* Bern., *T. sphaerocarpa* Chev., *T. pentagona* Bern. and *T. sagittata* Pavon], *T. guianensis* (Aublet) Gmel. (= *T. speciosa* Willd.), *T. Spruceana* Bern., *T. bicolor* Humb. et Bonpl., *T. glauca* Karst., *T. Bernoullii* Pittier, *T. microcarpa* Mart., *T. sylvestris* (Aublet) G. Don, *T. obovata* Klotzsch, *T. ferruginea* Bern., *T. grandiflora* (Sprengel) K. Schum., *T. angustifolia* Sessé et Mocino and *T. simiarum* Donnell-Smith.

796. CHEVALIER, A. 633.79:576.16:582
Notes sur le houblon. (**Notes on the hop**).
Rev. Bot. Appl. 1943 : 23 : 225–42.

A brief account is given of the origin, taxonomy and varieties of the hop.

CONDIMENTS 633.84

797. 633.842:575
635.48:575
635.653:575
ALTHAUS, W. G.

100th anniversary varieties.

Sth. Seedsman 1946 : 9 : No. 12 : 12, 38.

Brief descriptions are given of the following new vegetable varieties developed by the firm of Peter Henderson and Co., 35, Courtland Street, New York City: Empire State Pole Lima bean, Perpetual rhubarb and Golden California Wonder pepper.

The vines of the Lima bean variety are very vigorous, growing over 12 feet in length; the average length of the pods is 7–8 inches. The beans, usually six in a pod, are described as highly suitable for freezing purposes.

The Perpetual rhubarb variety, in addition to yielding a spring crop, produces stalks with good flavour and quality throughout the summer.

The Golden California Wonder pepper has green thick-walled fruit, with a sweet, mild flavour. The fruits are 4–4½ inches thick.

798. LEROY, J.-F. 633.842:582
Les piments. (**The *Capsicum* peppers**).
Rev. Bot. Appl. 1943 : 23 : 196–218.

Short descriptions are given of the more important commercial varieties of *C. frutescens* and *C. annum*.

799. 633.844
634.835:633.84
CHEVALIER, A.
Moutardes et vignes à verjus. (**Mustards and vines for verjuice**).
Rev. Bot. Appl. 1941 : 21 : 93–110.

This account of plants grown for mustard and vines for verjuice includes a brief mention of the various varieties concerned.

800. CHEVALIER, A. 633.844
Les moutardes d'Orient. Possibilité de leur culture en France et dans les colonies. (**The mustards of the East. Possibility of their cultivation in France and in the colonies**).
Rev. Bot. Appl. 1942 : 22 : 467–73.

An account is given of oriental varieties of *Sinapis nigra*, *S. juncea*, *S. arvensis* and *S. integrifolia* of possible interest to growers in France and in the French colonies.

YAZICIOĞLU, T.

633.85(56)

633.853.55:581.6(56)

Türkiye'nin nebatî yağ zenginliği. (Turkey's riches in oil-bearing plants).

T. C. Yüksek Ziraat Enstitüsü Basımevi, Ankara 1945 : No. 150 : Pp. 119.

The plants dealt with include: olive, cottonseed, sesame, poppy, linseed, sunflower, hempseed, safflower (*Carthamus tinctorius*), colza, *Eruca sativa*, castor oil plant, *Cephalaria syriaca*, apricot for kernel oil, soya bean, *Wiedemania orientalis*, groundnut, hazel, walnut, almond and *Pistacia vera*.

For each plant, the botany, yield of oil, regions of cultivation in Turkey, production figures, methods of oil extraction, by-products, and analyses of oils are given, and Turkish oils are compared with those of other countries.

Since 1929 the Seed Improvement Stations of Eskisehir and Yeşilköy have been promoting the cultivation of safflower.

The Adana Seed Improvement Station has carried out tests on six kinds of castor oil plants. These samples, ultimately forwarded for examination to the Ankara Higher Agricultural Institute, were found to have thin shells and a high oil content.

802. HACKBARTH, J.

633.85:575(43)

Fragen des Anbaues und der Züchtung von Ölpflanzen in Deutschland.

(Problems in the cultivation and breeding of oil plants in Germany).

Phosphorsäure 1941 : 10 : 131-39.

A number of oil-bearing plants are discussed with a view to breeding and selection for improvement in Germany.

It is suggested that rape should be improved in yield and general hardiness, as well as in winter hardiness, and that breeding for an advance in flowering and ripening time would help to obviate attack by pests. Summer rape should be bred for a better yield, whilst retaining its short developmental period. In the case of winter rape, selection should also be carried out to improve the oil yield by increasing the 1000 corn weight.

As regards summer turnip-rape, breeding for an enhanced yield is even more important than for summer rape.

With sunflowers, some success has already been obtained in breeding varieties sufficiently early ripening for the German climate, but more work on these lines is needed, and in addition breeding for pendant heads to lessen attack by birds is desirable as is also an increased oil content.

For soya bean, the aim should be even earlier ripening plants than those already evolved by German breeders; in this connexion the present lack of neutral-day varieties should be noted, though some breeders, after making a large number of crosses, have obtained progeny showing favourable transgressive segregations as regards early ripening. One difficult problem here is to combine early ripening with good 1000 corn weight. At present there are strains in Müncheberg which, whilst ripening sufficiently early, have yielded 17.5 dz/ha., the oil content being 3.2 dz/ha., and it is possible these figures may be improved upon.

By selection from land varieties of oil lupin, strains were obtained at Müncheberg with 12-13% of oil. For *Lupinus albus*, early ripening is also highly important.

A rindless marrow without tendrils has been produced.

Other oil-bearing plants suitable for improvement by breeding include *Camelia sativa*, *Eruca sativa*, *Raphanus sativus* var. *oleiferus*, *Cyperus esculentus*, *Madia sativa*, *Datura Stramonium* and *Oenothera biennis*.

The work of Wettstein on poppies, and of Hoffmann on hemp, already reviewed in *Plant Breeding Abstracts*, is mentioned.

E. W.

803.

633.85:575(47)

New varieties of oil-bearing plants.

Soviet News 1947 : No. 1624 : p. 3.

Brief mention is made of a new sunflower variety, produced by the Don Selection Station of Essential Oil Plants, under the direction of E. Zhdanov. The seeds of the new variety contain up to 39% oil content. New varieties of linseed and other oil crops have also been

developed at this station, richer in oil content than previously known varieties. All these varieties are cultivated on a wide scale in the Altai Mountains, North Caucasus and other regions of the U.S.S.R.

804. MENDES, P. T. and SOUSA, O. F. de 633.853.55.00.14(81)
Melhoramento da mamoneira (*Ricinus communis* L.). IV—Segunda e terceira séries de ensaios de variedades añas (1940/41 e 1941/42). [Improvement of the castor oil plant (*R. communis* L.). IV—Second and third series of trials of dwarf varieties (1940–41 and 1941–42)].
Bragantia, São Paulo 1945 : 5 : 351–58.

Varieties 38 and 14 are recommended for the Brazilian districts of Campinas, Ribeirão Preto, Pindorama and Tietê. Yield data are presented of these and other varieties.

805. MENDES, P. T. and SOUSA, O. F. DE 633.853.55.00.14(81)
Melhoramento da mamoneira (*Ricinus communis* L.). V—Primeira série de ensaios de linhagens e variedades (1938/39 e 1939/40). [Improvement of the castor oil plant (*R. communis* L.). V—First series of trials of races and varieties (1938–39 and 1939–40)].
Bragantia, São Paulo 1945 : 5 : 359–80.

Details are given on the yield and oil content of Brazilian races and varieties of dwarf, medium and tall castor oil plants. Trials at Campinas, Ribeirão Preto, Pindorama and Tietê showed that varieties behave very differently at different localities.

806. MENDES, P. T. and SOUSA, O. F. DE 633.853.55.00.14(81)
Melhoramento da mamoneira (*Ricinus communis* L.). VI—Segunda e terceira séries de ensaio de linhagens e variedades (1940/41 e 1941/42). [Improvement of the castor oil plant (*R. communis* L.). VI—Second and third series of trials of races and varieties (1940 41 and 1941–42)].
Bragantia, São Paulo 1945 : 5 : 381–96.

Information is presented on the behaviour in the field of the dwarf varieties Nos 38 and 39 and of various races.

807. DONA DALLE ROSE, A. 633.854.54:575
Trois races de lin à huile. (Marsic I, Capable, Blanc nain). [Three races of linseed. (Marsic I, Capable, Blanc Nain)].
Rev. Bot. Appl. 1940 : 20 : 634–35.

A summary is presented of an article by Dona dalle Rose already reviewed in *Plant Breeding Abstracts*, Vol. X, Abst. 519.

808. GRIEBEN, H. and CIPOLLA, G. 633.854.54.00.14(82)
Resultados de los ensayos comparativos de rendimiento "standard" entre variedades de lino para grano realizados en el año agrícola 1941/42. (Results of the comparative "standard" yield trials of varieties of linseed effected in the agricultural year 1941–42).
"Granos" Semilla Selecta, B. Aires 1942 : 6 : Nos. 10–12 : 3–32.

Information is presented on the yield, period of growth, and susceptibility to *Fusarium Lini*, *Sphaerella Linorum* and *Melampsora Lini* of the Argentine varieties: Benvenuto Labrador, Benvenuto Real, Buck 3, Buck 113, Entre Ríos H.39 M.A., Klein 11, La Previsión 18, Querandi M.A., P.330 M.A. and Lineta Buck 114.

809. ETCHECOPAR, J. A. and SÍVORI, E. 633.854.78:575(82)
Algunos aspectos en el mejoramiento del girasol. (**Some aspects of the improvement of the sunflower**).
"Granos" Semilla Selecta, B. Aires 1942 : 6 : Nos. 10-12 : 36-37.
A brief account is given of the Argentine sunflower breeding programme. Till now, the principal method used has been the inbreeding of the initial material, the latter consisting largely of Russian strains, followed by selection of promising forms.
Allusion is made to the possibilities of producing heterotic hybrids and synthetic varieties.
810. ETCHECOPAR, J. and SÍVORI, E. 633.854.78:575(82)
Notas sobre el mejoramiento del girasol. (**Notes on the improvement of the sunflower**).
Rev. Argent. Agron. 1941 : 8 : 252-60.
A description is given of the sunflower breeding programmes of the experimental stations at Pergamino and Santa Fe. The initial breeding material was mostly obtained from the Institute of Plant Industry, Leningrad. This has been subjected to selfing, hybridization and selection, and the possibility of obtaining heterotic hybrids and synthetic varieties is being considered.
811. CHEVALIER, A. 633.855.34:582:575.12
Taxonomie, biogéographie et sélection des palmiers du genre *Elaeis*. (**Taxonomy, biogeography and breeding of palms of the genus *Elaeis***).
Rev. Bot. Appl. 1943 : 23 : 295-307.
This review of the taxonomy of *Elaeis* deals especially with the varieties of *E. guineensis* and its hybrids with *E. melanococca*. The breeding possibilities of the genus are briefly indicated.
812. CHEVALIER, A. 633.855.357.4
Les Sapotacées à graines oléagineuses et leur avenir en culture. (**The Sapotaceae with oily seeds and their future in cultivation**).
Rev. Bot. Appl. 1943 : 23 : 97-159.
The first part of this article includes descriptions of the various varieties of shea nut [*Butyrospermum Parkii* (G. Don) Kotschy].

MEDICINAL PLANTS 633.88

813. PEREIRA, J. R. 633.88(81)
Contribuição para o estudo das plantas alucinatórias particularmente da maconha (*Cannabis sativa* L.). [**Contribution towards the study of plants producing hallucinations, particularly hashish (*C. sativa* L.)**].
Rev. Flora Medicinal, S. Paulo 1945 : 12 : Pp. 127.
In the general description of hallucination producing plants and their effects, the species discussed include coca, betel and tobacco. The second chapter is devoted entirely to hashish. An experimental study revealed that the varieties grown in Brazil have the same physiological effect as the Indian and North American varieties.
814. LITARDIÈRE, R. DE 633.88:576.356.5
Recherches taxonomiques et caryologiques sur le *Melissa officinalis* L. (**Taxonomic and caryological researches on *M. officinalis* L.**).
Rev. Bot. Appl. 1945 : 25 : 16-18.
M. officinalis is subdivided into two sections, var. *genuina*, the medicinal and culinary balm, and var. *villosa*, a wild form. The former variety is diploid with $2n = 32$ chromosome; the latter is tetraploid.

815. KRUG, C. A.,
ANTUNES, C. S. N.,
NERY SOBRINHO, J. B. C. and
CARVALHO, A. 633.885.1:581.6(81)
Pesquisas de aclimação de quineiras (*Cinchona* sp.) no estado de São Paulo. (**Investigations on acclimatizing *Cinchona* sp. in the state of São Paulo**).

Inst. Agron. Estad. A. Paulo Fundos Univ. Pesquisas 1945 : Pp. 97.

A description is given of the trials of 102 varieties of *Cinchona* which are being conducted at 36 regional centres in the Brazilian state of São Paulo. Details are given of performance under local conditions and of quinine yield.

There are two appendices, one on analytical methods, and the other on *Cinchona* plantations in Guatemala and Costa Rica.

RUBBER PLANTS 633.91

816. CHEVALIER, A. 633.912:582
Études botaniques sur le genre *Hevea*. (**Botanical studies on the genus *Hevea***).
Rev. Bot. Appl. 1942 : 22 : 1-12.

Descriptions and figures are given of *H. Benthamiana* Müll. Arg., *H. lutea* (Benth.) Müll. Arg., *H. guianensis* Aublet and *H. guianensis* Aublet var. *collina* (Huber) Ducke. Notes are added on the natural variation within these species and on interspecific hybridization.

817. SOLIVA, M. 633.912-1.557
L'évolution de la culture du caoutchouc au cours des dix dernières années. (**The development of rubber cultivation during the last ten years**).

Rev. Bot. Appl. 1942 : 22 : 47-69.

This review includes yield data for several of the more important commercial clones.

818. Improved kok-saghyz variety. 633.913:575(47)
Soviet News 1946 : No. 1568 : p. 3.

A note is given on the highly productive variety of *Taraxacum Kok-saghyz*, recently developed by research workers of the Soviet Academy of Sciences under the leadership of Navašin. The root yield is 60% higher than the crop given by the ordinary Russian dandelion.

FRUITS AND NUTS 634

819. MIÉVILLE, R.,
POILANE, E. and 634(59.7)
CHEVALIER, A. 634.1:582(59.7)
Les possibilités de l'Indochine du Nord en cultures fruitières. (**The possibilities of fruit cultivation in northern Indochina**).
Rev. Bot. Appl. 1942 : 22 : 363-91.

An account is given of species of *Prunus*, *Pyrus*, *Malus*, *Dacrydium*, *Fragaria*, *Juglans*, *Castanea* and *Litchi* cultivated in Indochina. The following new species of *Pyrus* are described: *P. Loquiho*, *P. candidissima*, *P. ligustrifolia* and *P. moiorum*.

820. DUMONT, H. and 634(61.1)
VALDEYRON, G.
Le verger d'essais de Sbeitla. (**The trial orchard of Sbeitla**).
Ann. Serv. Bot. Tunis. 1941 : 18 : 3-38.

Notes are presented on Tunisian varieties of apricot, peach, plum, almond, apple, pear and cherry.

821. BROOKS, R. M. and 634(73)
OLMO, H. P.
Register of new fruits and nut varieties—list No. 2.
Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 544-69.

A descriptive list is given of nut and fruit varieties in the United States.

822. BOEUF, F. 634:575
 Role de la génétique dans l'amélioration des cultures fruitières coloniales.
 (**The role of genetics in the improvement of colonial fruit cultivation**).

Conf. Inst. Fruits Agrumes Coloniaux, Paris 1944 : No. 7 : Pp. 8.

This allocution at the Institut des Fruits et Agrumes Coloniaux surveys the many ways in which an application of genetical principles can assist in the breeding of improved fruit varieties for the French Colonial Empire.

823. 634:575(47)
 Les cultures fruitières en U.R.S.S. (**The cultivation of fruit trees in the U.S.S.R.**).

Rev. Bot. Appl. 1945 : 25 : 113-16.

An account is given of the theories and achievements of Mičurin, based on an article by Kholodny (Holodnii). Reference is also made to the work of Jakovlev on peaches and of Lysenko on cotton and kok-saghyz.

824. KONOVALOV, I. N. 634:575:007(47)
 (**The great Russian scientist, I. V. Mičurin**).
 Sovetskaja Botanika (Soviet Botany) 1945 : 13 : No. 5 : 3-6.

An article on Mičurin's fruit breeding work is given, in commemoration of the tenth anniversary of this Russian plant breeder's death.

825. W-m....., H. 634:581.481
 En kuriositet. (**A curiosity**).
 Fruktodlaren 1944 : No. 1 : 17-18.

A triplet apple is described and illustrated. It probably arose from a tripartite pistil. A twin apple is also shown.

826. MIKHAILOV, A. 634-2.111-1.521.6:581.143:575(47)
Siberian fruit—at 50 degrees below zero.
 Soviet News 1946 : No. 1356 : p. 2.

Creeping forms of fruit trees have been developed by A. Kiziurin of the Omsk Agricultural Institute, which are capable of growing in the open in Siberia. Such creeping forms remain in the less cold layer of air nearest the earth. Experiments have now been begun in the developing of creeping tropical fruit trees for cultivation on the Black Sea coast.

827. 634.00.15(73)
 MACK, W. B. 635.00.15(73)
American horticultural science today.

Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 533-43.

The scope of research on fruits, vegetables and ornamental plants in the United States is surveyed. Reference is made to breeding and genetical investigations.

828. 634-2.111-1.521.6:575(47)
Try a pear-apple!
 Soviet News 1946 : No. 1438 : p. 3.

A fruit bearing hybrid of the pear and apple is briefly described. The "pear-apple", which has been developed at the Mičurin laboratory, is said to be capable of resisting 72 degrees of frost. Varieties of Chinese plums and peaches have been obtained which are equally frost resistant. The production of new apple, pear, plum, peach, apricot and berry fruit varieties, capable of withstanding the northern frosts, is to be carried out during the next five years. Investigations on the cultivation of almonds, walnuts and water-melons in the northern and central regions are also in progress.

829. 634.1:575(48.5)
 634.2:575(48.5)
 PERSSON-FERLENIUS, G. R. 634.5:575(48.5)
 Praktiska synpunkter på växtförädlingen av fruktträd. (**Practical aspects of the breeding of fruit trees**).

Sverig. Pomol. Fören. Årsskr. 1945 : 46 : 92-97.

The author outlines the changes in the requirements of the Swedish population in regard

to fruit supplies and how the Swedish breeder and the Balsgård Station can provide apples and other fruits of the desired quality and at the season to suit the market.

Among the characters that would be useful in any new varieties of apples produced are: reliability of yield; self-fertility or parthenocarpy; hardiness and disease resistance; suitability for vegetative reproduction without the use of foreign stocks; and suitable colour, shape, size, taste and keeping qualities of the fruit.

Triploidy and tetraploidy should be exploited, as far as possible, in breeding.

As regards pear breeding, varieties that keep well and are free from grittiness are needed.

Gummosis in plums is partly a varietal character, which it should be possible to eliminate by producing new varieties.

Cherry varieties with large fruits are required to replace former Italian imports.

It is suggested that self-fertile forms of all stone fruits should be developed. The Mälars plum is an example of a vegetatively propagated fruit.

830. NYQUIST, J. 634.11:575(48.5)

Spässerudsäpplet. (**The Spässerud apple**).

Fruktodlaren 1944 : No. 1 : 16-17.

This apple is thought to be probably a diploid, judging by its well formed seeds.

831. GORŠKOVA, T. P. 634.11:575.127.5:634.13

(**Hybrids between apple and pear**).

Agrobiologija (Agrobiology) 1946 : No. 1 : 130-33.

Grafts of high quality cultivated apples were grafted as mentors on the crowns of seedlings of *Malus baccata* that were flowering for the first time, and which in the following year were pollinated with various pear varieties and species. The best sets were obtained from pollinations with the local pear Tonkovetka; those pollinated with *Pyrus ussuriensis* were less successful.

Very few fruits were obtained from 5000 flowers pollinated, and the seedlings produced from the few seeds were very weak in development, reaching a height of only 10-15 cm. in three years; many of them died before reaching this age, mostly owing to a defective root system. Those seedlings which survived began to develop well in the fourth and fifth year, but proved exceedingly susceptible to changes in growing conditions. If watered they resembled the pollen parent in leaf type; if left without water they resembled the Siberian crab. Often a single tree showed the characters of different parents at different levels. This extreme sensitivity disappeared after the sixth or seventh year and the pear characteristics came to predominate.

The hybrids with the Dekanka pear were less frost resistant than those with *P. ussuriensis*; those plants which survived the first two years, however, were quite resistant and withstood even the severe frosts of 1939-42. In their ninth year the seedlings had still not begun to bear. Seedlings that resembled the crab on the other hand began to bear in their fourth or fifth year.

Two seedlings of *M. baccata* x the local pear bore fruit for the first time in 1944, No. 2216 being nine years old and No. 2400 eight years. The flowers were pollinated with a mixed pear pollen; 40 fruits set on No. 2216 and 34 on No. 2400. The numbers that reached maturity were 17 and 22 respectively. The average weight per fruit was 20 grm.; the fruits were yellow, pear shaped, with astringent, acid or bitter taste; the sepals were attached. Many of the fruits contained no seeds and only 17 seeds in all were obtained.

832. CALDAS, J. P. 634.11:576.356.5

Estudos citológicos em variedades culturais de maceiras. (**Cytological studies of cultivated varieties of apple**).

Lisboa 1945 : Pp. 48.

Cytological studies on eight Portuguese apple varieties are reported. Seven of them were diploid, and since many of the best cultivated varieties are triploid, special attention was given to the one triploid variety, Gigante do Douro. In crosses with diploid varieties it gave very few seeds only a few of which germinated, and the few seedlings produced were much reduced in vigour. In the meiosis of the variety itself, all the irregularities customarily associated with triploids were observed. Secondary association was observed in this, as also in the diploid varieties.

Tests of pollen germination *in vitro* showed great differences within the individual varieties. It was found that pollen required to be kept for about 48 hours at room temperature before it reached its full germination capacity. There were marked differences also between varieties, and the results obtained, together with an examination of published data by other authors, show that the triploid varieties never have a germination percentage of more than 30% and are invariably inferior to the diploids. This combined with the reduced vigour of the seedlings obtained leads the author to conclude that the triploid varieties are unsuitable parents for breeding and that better results will be obtained by crossing diploid and tetraploid varieties.

833. OLDÉN, E. J. 634.11:576.356.5:575(48.5)
 Några nya högkromosomiga äppletyper. (Some new high-chromosome types of apples).
 Sverig. Pomol. Fören. Årsskr. 1945 : 46 : 105-15.

In this report on research, the author assembles much information, already reviewed in *Plant Breeding Abstracts*, on polyploid apples in Sweden. Since 1937, 36 tetraploids and three forms with over 68 chromosomes, one with 76 and two with 73, have been discovered among the progeny of open-pollinated triploid varieties. All three of the high-numbered types were derived from the triploid variety Ribston.

Many of the aneuploids obtained showed poor growth, and drooping habit, and poor resistance to cold and to fungous and insect parasites.

Morphological studies of five new tetraploids and the high-numbered aneuploids were made. There was a clear difference between triploids and tetraploids in the size of the stomata, but a less clearly marked one between triploids and high-chromosome aneuploids. In leaf thickness the diploids and high-chromosome plants differed distinctly, but the triploids did not differ so clearly from the tetraploids and high-numbered aneuploids. Comparative observations, for which the technique is described, were also made regarding leaf thickness, the size of the stipules, and the serration of the leaf margin.

Some tetraploids suffered only very slightly from scab (*Venturia inaequalis*) and not at all from mildew (*Podosphaera leucotricha*). Red spider (*Paratetranychus pilosus*) did not appear to discriminate between high and low chromosome types.

834. EINSET, J.,
 BLASER, H. W. and
 IMHOFE, B. 634.11:576.356.5:575.255
A chromosomal chimera of the Northern Spy apple.
 J. Hered. 1946 : 37 : 265-66.

A large-fruited sport of the Northern Spy apple is reported, possessing a diploid layer of cells surrounding a central tetraploid portion. Similar sports of McIntosh, Rome and Jonathan were found to be diploid.

835. GERRITSEN, J. B. 634.11:581.162.32:581.162.5:576.356.6
 Bestuiving en vruchtzetting van de Schoone van Boskoop. (Pollination and fruit setting of Belle de Boskoop).
 Fruitteelt 1946 : 36 : 38-39.

Investigations here described show that the Belle de Boskoop apple requires cross-pollination, and that triploid varieties are unsuitable for the purpose.

836. MEADER, E. M. and
 BLASBERG, C. H. 634.11-2.111-1.521.6(74.3)
Blossom hardness of forty-five apple varieties.
 Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 58-60.

Data are given on the injury caused by spring cold during 1945 to the flower buds of 45 apple varieties in an orchard at Burlington, Vermont.

837. ROBERTS, R. H. 634.11-2.111-1.521.6(77.5)
Cold injury of apple blossom, 1945.
 Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 61-63.

The effects of cold upon apple blossoms at different stages of development were observed in several varieties during the spring of 1945, at Madison, Wisconsin.

838. MOORE, R. C. 634.11-2.3-1.521.6:575.11(75.5)
Inheritance of fire blight resistance in progenies of crosses between several apple varieties.

Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 49-57.

F₁ hybrid apple seedlings obtained from 14 controlled crosses were artificially inoculated with fire blight, *Erwinia amylovora* (Burr.) Wins. et al. In general, significant segregation for reaction to fire blight was found. The most resistant progenies were those derived from the crosses Winesap x Delicious, Winesap x Jonathan and Arkansas Black x Delicious. Progenies of Melon x Jonathan, Melon x Lowry, Jonathan x Rome and Winesap x York, were the most susceptible. The data obtained suggest that a number of factors are concerned in the observed type of reaction to fire blight. In a number of crosses resistance appeared to be partially dominant to susceptibility.

839. MORETTINI, A. 634.22:575"793"(45)
 Due nuove varietà di susine precoci. Gli incroci Morettini 1. ° Florenzia x Beauty n. ° 355. 2. ° Shiro x S. Rosa n. ° 243. **(Two new varieties of early plums. Morettini's hybrids Florenzia x Beauty No. 355 and Shiro x S. Rosa No. 243).**

Riv. Soc. Tosc.ortic. 1946 : 31 : 73-87.

Great numbers of American plum varieties have been introduced into Italy in latter years, but very few of them have proved suitable for cultivation, owing to defects in quality, yield or other features, the chief of which are enumerated. The author began hybridization work in 1931, using the early, high yielding variety Florenzia as one of the parents. It is a natural hybrid thought to be descended from *Prunus salicina* or *P. triflora*. Other varieties used as parents also belonged to the Sino-Japanese group, namely, Santa Rosa, for fruit quality, and Shiro and Beauty for prolific set. A great variety of types was obtained in the progeny, and eight of the most promising have been selected for further observation. Two of these, No. 355 and No. 243, are thought to be of sufficient merit to warrant their being tested in different parts of the country. The former ripens at the same time as such varieties as Beauty and Red June and only a few days after Florenzia. No. 243 is earlier than Shiro and only a few days later than No. 355; it is self-sterile and not quite so prolific in yield, but its special value lies in the extreme solidity of its flesh, in consequence of which it exceeds all other varieties in transporting and keeping capacity. Full descriptions of the two varieties are given.

840. JENSEN, H. 634.22:575.127.2:576.356.5(48.5)
 Växtförädling av plommon. **(Plum breeding).**
 Sverig. Pomol. Fören. Årsskr. 1945 : 46 : 98-104.

Introducing his views on how plums combining the best available genotypes can be bred to suit Swedish conditions, the author defines the botanical significance of the plum group and examines the distribution of various species of *Prunus* and the common origin of *P. domestica* and *P. insititia*, with observations on their subsequent development in different directions.

Though, among the American varieties imported into Sweden, e.g. those belonging to species such as *P. angustifolia*, *P. hortulana*, *P. Munsoniana*, many are unsuited to the climate, some could be successfully included in the Swedish collection of plums or employed in breeding. Using as initial material, not the wild species themselves, but the varieties and hybrids which have proved best suited to conditions similar to those in Sweden, varieties could probably be produced which are sufficiently hardy, resistant to pests and fungous diseases, and much earlier ripening than any of the plums at present in the country. Similarly, hybridization of large-fruited, hardy types of the 32-chromosome Swedish sloe, with the best and hardest varieties of the various 16-chromosome species referred to above could result in a number of 48-chromosome species parallel with the species of our ordinary plums. A great variety of forms could thus be produced. Swedish botanists are collaborating in seeking first-class types of sloe from areas in Northern Sweden. The material collected will be rapidly multiplied and added to the collection which is being made at Balsgård.

Colchicine treatment of some of the 16-chromosome species might yield 32-chromosome forms which could be crossed with other diploid species to obtain new allopolyploid 48-chromosome forms in which the flavour of the sloe, so strongly transmitted and inherent in many of our European plums, might not be so strong.

P. Besseyi is also described with comments on its distribution and value as an intermediary facilitating hybridization between *Prunus* and many other 16-chromosome species of different groups, e.g. sweet cherry, most American and Asiatic plums, apricots and peaches, and also plums of the 48-chromosome *domestica* group. *P. Besseyi* can also be used with advantage as a hardy dwarf stock for the 16-chromosome plums, cherries, peaches and apricots. Its soil requirements are modest and it is easily multiplied by layers or root cuttings.

841. *ENIKEEV, H. K. 634.23:575.127.2:581.165.71:575.3
(Formation of characters in interspecific cherry hybrids when grafted).

Agrobiologija (Agrobiology) 1946 : No. 1 : 95-106.

Buds from one-year-old seedlings of *Cerasus Besseyi* Bail. crossed with *C. tomentosa* Thunb. and *Prunus ussuriensis* were grafted on to the parental species and in the latter hybrid also on to *P. americana* Marsh. and *P. spinosa* L., seedlings growing on their own roots serving as controls.

In the extremely severe winters of 1938 to 1941, the hybrids grafted on to *P. spinosa*, and, to a lesser extent, on to *C. tomentosa* were less subject to rotting under the snow than were the same hybrids grown on their own roots. Most of the hybrids of *C. Besseyi* x *C. tomentosa* on their own roots flowered early like *C. tomentosa*, while those grafted on *C. Besseyi* flowered three to seven days later. Hybrids of *C. Besseyi* x *P. ussuriensis* also flowered four to five days later when grafted on *C. Besseyi* than on their own roots. Fruits of the hybrids grafted on *C. Besseyi* ripened six to fifteen days later than those on their own roots.

The grafted plants often yielded more fruit than the corresponding hybrids on their own roots, and their fruits were almost invariably larger, regardless of whether the particular rootstock used had large or small fruits. In colour and flavour some hybrids were more influenced in the direction of the rootstock species than others; some hybrids of *C. Besseyi* x *C. tomentosa*, when grafted on *C. Besseyi*, had a much higher content of tannins than when grafted on *C. tomentosa*. Very few of the hybrids of *C. Besseyi* x *P. ussuriensis* showed any influence of the rootstock species and were all tart and astringent. Two grafts, however, one on *P. americana* and one on *P. spinosa*, had a reduced tannin content and consequently a better flavour than those on their own roots.

Some 500 of the hybrids were selfed but very few seeds were obtained. Three groups of seedlings as regards vegetative development occurred in the F_2 from *C. Besseyi* x *C. tomentosa*, one group resembling the former and one the latter parent, together with an intermediate group.

In view of those results, breeders of stone fruits are recommended to make a careful choice of the species to be used as rootstock in raising their seedlings, and also in raising plants from which seed progenies are to be obtained.

842. 634.25(75.8)
Nationwide fruits. Peaches.

Amer. Fruit Gr. 1946 : 67 : No. 5 : 18-19.

Notes are given on the Dixigem and Dixired peach varieties. The parentage of Dixigem is Admiral Dewey x St John x South Haven. It ripens earlier than Golden Jubilee and at about the same time as Early Rose. It yields fruit of good size and quality, almost free-stone in type. It is particularly recommended for the local market in Georgia. Dixired is a seedling of Halehaven selfed. The variety has been tested mostly in Georgia. It ripens two weeks earlier than Golden Jubilee. The fruit is a clingstone type, round, medium sized, and attractive in appearance.

* An extended summary of this paper is on file at the Bureau.

843. 634.25:575(77.4)

Nationwide fruits. Peaches.

Amer. Fruit Gr. 1946 : 67 : No. 6 : p. 25.

A note is given on the new Fairhaven peach variety (cf. Abst. 844).

844. 634.25:575(77.4)

JOHNSTON, S.

The Fairhaven peach.

Quart. Bull. Mich. Agric. Exp. Sta. 1946 : 29 : 86-87.

The new Fairhaven peach variety, introduced by the Michigan Agricultural Experiment Station, has been developed from the cross J. H. Hale x South Haven. It is early maturing, vigorous and productive. Tests have indicated that its fruit buds are as cold resistant as those of Halehaven. The fruit is medium large, nearly round, and mostly of a bright golden colour.

845. 634.25-2.111-1.521.6:578.08
SCOTT, D. H. and
CULLINAN, F. P.

Some factors affecting the survival of artificially frozen buds of peach.

J. Agric. Res. 1946 : 73 : 207-36.

A report is given of experiments on the effects of several factors, such as shoot size, moisture content of the buds, minimum temperature and pre-hardening, upon the survival of peach buds when exposed to artificial freezing. Artificial freezing tests appear to be valuable as a means of studying varietal cold resistance and the inheritance of hardiness.

846. 634.3:576.16:582(59.7)

CHEVALIER, A.
L'origine géographique des Aurantiacées (agrumes) cultivées et les étapes de leur amélioration spécialement en Indochine. [The geographical origin of the cultivated Aurantiaceae (citrus fruits) and the stages of their improvement especially in Indochina].

Rev. Bot. Appl. 1943 : 23 : 15-25.

Descriptions are given of Indochinese citrus fruit species. Indochina is regarded as an important centre of origin of citrus fruits and it is believed that a study of the Indochinese forms will throw much light on the evolutionary history of the group.

847. 634.3:582

CHEVALIER, A.

Subdivision et composition actuelle du genre *Citrus*. (Subdivision and present composition of the genus *Citrus*).

Rev. Bot. Appl. 1943 : 23 : 11-15.

A classification of the genus *Citrus* is presented, based principally on the system of Tanaka.

848. 634.3-2.411.4-1.521.6(82)

GONDELL, M. A.

La susceptibilidad de diferentes especies y variedades citricas a la *Phytophthora citrophthora* (Sm. y Sm.) Leon., *P. parasitica* Dastur y *P. megasperma* Leon. [The susceptibility of different citrus species and varieties to *P. citrophthora* (Sm. et Sm.) Leon., *P. parasitica* Dastur and *P. megasperma* Leon.].

Minist. Agric. Nac. Direcc. Gen. Invest. Inst. Sanid. Veg., B. Aires 1946 : 2 : Ser. A : No. 19 : Pp. 24.

Details are given on the varietal resistance of citrus fruit varieties to the aforesaid fungi

849. 634.3-2.8-1.521.6:581.165.711

MOREIRA, S.

Cavalos para citros em São Paulo. (Rootstocks for citrus fruits in São Paulo).

Rev. Agric. Piracicaba 1946 : 21 : 206-26.

Rootstock trials of citrus varieties are reported, with special reference to resistance to *tristeza* (sadness).

850. SIMONET, M.,
CHOPINET, R. and
BACCIALONE, J. 634.37(44)
Contribution à l'étude de quelques variétés de figuiers des Alpes-Maritimes et du Var. (*Contribution to the study of some fig varieties of Alpes Maritimes and Var.*).
Rev. Bot. Appl. 1945 : 25 : 44-72.

Descriptions and figures are given of the following varieties: La Dorée, Du Japon, Blanche, Cotignane, Longue d'Aout, Lampeira, Dauphine, Becuelle, Abicou Noir, Douqueira Negra, Briasca, Negrette, Bellone, Mouissonne, Sultane, La Panachée, Pittalusse Blanche, Pittalusse Noire, Bourjassotte Blanche, Bourjassotte Noire, Col de Dame Blanc, Col de Dame Noir, Tapa Cartin, Seyrole, Dame Blanche, Dame Noire, Peconjudo, Marseillaise, Bernissenque, Verdale, Rolandine Blanche and Rolandine Noire. Shorter references are made to other local forms.

851. BARRETT, M. F. 634.37:582
Ficus in Florida—1. Australian species.
Amer. Midl. Nat. 1946 : 36 : 412-30.

Descriptions are given of the following Australian species and varieties of *Ficus* which have been introduced into Florida: *F. rubiginosa*, *F. Watkinsiana*, *F. stephanocarpa*, *F. macrophylla*, *F. lacor* var. *Cunninghamii*, *F. platypoda* var. *petiolaris*, and *F. Henneana*. Taxonomical nomenclature is discussed.

852. DUGAND, A. 634.37:582(86)
Nuevas nociones sobre el género *Ficus* en Colombia, V. (**New ideas on the genus *Ficus* in Colombia, V.**).
Caldasia, Bogota 1946 : 4 : 112-20.

This contribution to the author's series of papers on the genus *Ficus* (cf. *Plant Breeding Abstracts*, Vol. XVI, Absts 1403-06) includes descriptions of the new species *F. calimana*, *F. Matiziana* and *F. peroblonga*.

853. DUGAND, A. 634.37:582(86)
Nuevas nociones sobre el género *Ficus* en Colombia, VI. (**New ideas on the genus *Ficus* in Colombia. VI.**).
Caldasia, Bogota 1946 : 4 : 229-30.

A description is included of the new species *F. loretoyacuensis*.

854. LEROY, J. F. 634.4
634.65
Fruits tropicaux et subtropicaux d'importance secondaire. (**Tropical and subtropical fruits of secondary importance**).
Rev. Bot. Appl. 1944 : 24 : 34-50.

This review includes descriptions of the more important varieties of avocado, mango, papaya, litchi, mangosteen, guava and cherimoyer.

855. CRONQUIST, A. 634.43:582
Studies in the Sapotaceae—VI. miscellaneous notes.
Bull. Torrey Bot. Cl. 1946 : 73 : 465-71.

This paper completes the revision of the American genera of Sapotaceae (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 918).

856. MUSTARD, M. J. and
LYNCH, S. J. 634.441:581.145.1
Flower-bud formation and development in *Mangifera indica*.
Bot. Gaz. 1946 : 108 : 136-40.

A study was made of floral development from the time of flower-bud differentiation in the Haden, Brooks and Cambodiana varieties and a turpentine seedling mango.

857. DANIELSSON, B. 634.5:576.356.5
Polyploida hasseltyper. (**Polyploid types of hazel**).
Sverig. Pomol. Fören Årsskr. 1945 : 46 : 116-22.

Sweden requires hardy hazel nuts of good quality and with a high yield. Great variation

was observed among the hazel nuts in the country in 1939-42, and a collection, including the hardiest types for breeding purposes, was made from different localities in southern Sweden, and sown at Balsgård 1943. More materials was obtained later.

In view of the conflicting views regarding the chromosome number of the hazel, a study was made of *Corylus Avellana* and the diploid was found to have $2n = 22$ chromosomes. Difficulty was experienced in finding material in division; the early morning is stated to be the best time for fixing. The haploid number was found to be 11. Reasons for Woodworth's different results are examined.

After colchicine treatment, a triploid plant ($3n = 33$) was discovered; as colchicine action usually leads to chromosome duplication, other possible ways in which this plant may have arisen are suggested.

Further colchicine experiments with different material in 1945 led to the production of five plants with roots containing 44 chromosomes, eight with mixoploid root tissue (diploid and tetraploid), and some with diploid roots. This third group is, however, assumed to be also mixoploid because of its morphological peculiarities and large stomata.

All the tetraploid plants grew slowly and had thick, biserrate leaves with denser and coarser pubescence than the diploid plants.

858. CHEVALIER, A. 634.51:582:575.127.2(59.7)
Variabilité et hybridité chez les noyers. Notes sur des *Juglans* peu connus, sur l'*Annamocarya* et un *Carya* d'Indochine. (**Variability and hybridity in the walnuts. Notes on little known species of *Juglans*, *Annamocarya* and a *Carya* from Indochina.**)
Rev. Bot. Appl. 1941 : 21 : 477-509.

In this taxonomic review of a number of *Juglans* species, special attention is paid to botanical varieties and interspecific hybrids. Two new species are described from Indochina, viz. *J. Poilanei* and *T. indochinensis*; after describing the latter species as a member of the genus *Juglans*, the author goes on to redescribe it as a member of a new genus *Annamocarya*, which is believed to be intermediate in several respects between *Juglans* and *Carya*. An account is also given of the Indochinese species *Carya tonkinensis*.

859. ROMBERG, L. D. and SMITH, C. L. 634.52:575.12:575.14(76.4)
Effects of cross-pollination, self-pollination, and sib-pollination on the dropping, the volume, and the kernel development of pecan nuts and on the vigor of the seedlings.
Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 130-38.

No evidence of self and cross incompatibility, or of selectivity of the pollen, was obtained in the pecan varieties studied. Cross-pollination resulted in a lower summer fall of immature nuts, greater total nut yield, higher percentage of large clusters containing three or more nuts, lower percentage of poorly developed nuts and higher yield of commercially acceptable nuts, than self-pollination. The yields of commercially acceptable nuts of the Mahan and San Saba Improved varieties obtained by using mixtures of the pollen of these two varieties were intermediate between those secured by selfing and crossing. Similarly, the yield of the Jersey pecan was intermediate when pollinated by the sib varieties, Western and San Saba Improved.

Effects of heterosis and metaxenia were observed in the kernel weight and nut volume respectively. Seedling vigour was associated with the heterozygous condition.

860. COVAS, G. and RAGONESE, A. 634.6:582(82)
Las palmeras argentinas del género "*Acrocomia*". (**The Argentine palms of the genus *Acrocomia*.**)
Rev. Argent. Agron. 1941 : 8 : 1-7.

A description is included of the new species *A. Chunta*.

861. CHEVALIER, A. 634.63:575.42(44)
 634.53:575.42(44)
 634.51:575.42(44)
 Trois arbres précieux de France à améliorer: olivier, noyer, chataignier. Utilité d'en étendre la culture et de la moderniser. (**Three valuable French trees requiring improvement: the olive, walnut and chestnut. The usefulness of extending their cultivation and modernizing it).**
 Rev. Bot. Appl. 1941 : 21 : 206-21.

The olive, chestnut and walnut exist in France in the form of a large number of varieties, many very old. It is suggested that these might be selected with advantage, and the inferior types dispensed with.

862. BRIERLEY, W. G. and LONDON, R. H. 634.711-2.111-1.521.6:581.43(77.6)
A study of cold resistance of the roots of the Latham red raspberry.
 Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 215-18.

The cold resistance of the roots of the Latham raspberry was investigated under conditions in Minnesota. The variety sustained no severe injury at soil temperatures down to -2° F. Under the usual winter conditions in Minnesota the roots of this variety are therefore unlikely to be severely injured or killed.

863. BRIERLEY, W. G. and LONDON, R. H. 634.711-2.111-1.521.6(77.6)
Some relationships between rest period, rate of hardening, loss of cold resistance and winter injury in the Latham raspberry.
 Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 224-34.

Various aspects of winter hardiness were analysed in the Latham raspberry, at the University of Minnesota. The results suggest that in breeding for hardiness in the raspberry the objectives should include not only a high level of ultimate hardiness and the ability to harden rapidly, but also the capacity to retain cold resistance once it is developed, a longer rest period or deeper dormancy to prevent bud formation out of season, and the capacity to reharden.

864. GERRITSEN, J. D. 634.72-2.421.6-1.521.6
 Vragen rondom de bladvalziekte van de roode bes. (**Problems about the leaf-spot of red currants).**
 Tijdschr. PlZiekt. 1946 : 52 : 119-20.

The fungus (*Pseudopeziza Ribis* Kleb.), causing leaf spot of red currants, also attacks the white and the black currant and the gooseberry. The red currant is the most susceptible, but there is a great difference in the degree of susceptibility among varieties, e.g. Fay's Prolific, Versailles and Laxton No. 1 are very sensitive, while Deutsche Zure (Prince Albert) and Erstling aus Vierlanden are resistant. This difference is probably due to ancestry, the last two varieties being derived from *Ribes petraeum*, and Fay's Prolific and Versailles from *R. vulgare*.

Problems still requiring investigation are:—

(1) Is it the same *Pseudopeziza* which attacks both the red and the black currant and the gooseberry, or are different races involved? (2) The incidence of *Mycosphaerella Ribis*, which produces very similar lesions on the leaves and may easily be confused with *Ps. Ribis*.

865. JOHNSTON, S. 634.73:575.127.2(77.4)
Observations on hybridizing lowbush and highbush blueberries.
 Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 199-200.

Crosses between standard varieties of the high bush blueberry (*Vaccinium corymbosum*) and selections of the low bush blueberry (*V. Lamarkii*) have been investigated with the hope of securing hybrids with an intermediate growth habit and larger berries than the low bush selections, which would be suitable for cultivation in the northern area of the Lower Peninsula of Michigan. The undesirable characters of low growth habit, dark fruit colour and small fruit size, however, have been found to be dominant or nearly

dominant in the F_1 . The F_2 hybrids are too young for satisfactory observations to be made on the inheritance of these characters.

866. BAILEY, J. S. and FRENCH, A. P. 634.73:578.088
Identification of blueberry varieties by plant characters.
 Bull. Mass. Agric. Exp. Sta. 1946 : No. 431 : Pp. 20.

Vegetative characters useful for the identification of blueberry varieties are described and illustrated. The bulletin also includes an identification key and descriptive notes of 22 varieties.

867. FAGERLIND, F. 634.74:581.162.5:575.127.2
 Pollenkonkurrenz und Bastardierungsschwierigkeiten in der Gattung
Rosa. (**Pollen concurrence and difficulties of hybridization in the
 genus *Rosa*.**)
 Svensk Bot. Tidskr. 1946 : 40 : 284-92.

A discussion is presented of various causes inhibiting interspecific hybridization in *Rosa*. These include differences in chromosome number, especially where the maternal chromosome number is the lower; antagonism between self and foreign pollen, a type of inhibition which can be minimized by allowing a time interval to elapse between the applications of the foreign and self pollen respectively; abortion of the embryo; and failure of the embryo to germinate.

868. LOOMIS, N. H. and DARROW, G. M. 634.75:575(73)
Suwannee—a new home-garden strawberry.
 Circ. Miss. Agric. Exp. Sta. 1945 : No. 123 : Pp. 3.

The new Suwannee strawberry variety originated from a cross between Missionary and Howard 17 (Premier). It is particularly suitable for home garden cultivation in the southern United States; it is not, however, recommended for general market purposes on account of its insufficient firmness. It produces fruit with high quality even under adverse conditions; it ripens early and gives a heavy crop throughout a long picking season. Suwannee is unusually drought resistant, and is free from yellows.

869. SLATE, G. L. and ROBINSON, W. B. 634.75:577.16:575(74.7)
**Ascorbic acid content of strawberry varieties and selections at
 Geneva, New York in 1945.**
 Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 219-23.

Information is given on the ascorbic acid content of 37 varieties and a large number of hybrid selections of strawberry. The preliminary data suggest that the Beacon variety may be useful in breeding for high ascorbic acid content.

870. WILSON, G. B. 634.771:576.354.4:576.356.5
**Cytological studies in the Musae. II. Meiosis in some diploid
 clones.**
 Genetics 1946 : 31 : 475-82.

The first paper in this series dealt with the meiosis of triploid species of *Musa* (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1911). The second paper reports the results of investigations on *M. rubra* (?), *M. Balbisiana* and *M. Nagensium*. Of the 18 clones investigated, 15 behaved as normal diploids, although occasional abnormalities in meiosis were observed. In Zebrina E (*M. acuminata*) and an unidentified Philippine variety (*M. Balbisiana*), a marked tendency to asynapsis was found; in the latter clone only a single chromosome pair appeared to be involved, while in Zebrina E one to seven pairs were affected. The third exceptional variety, Pisang Lilan (*M. acuminata*), is considered to be a reciprocal interchange hybrid.

The hypothesis is developed that the tetraploids obtained from crosses of Gros Michel x *M. acuminata* are produced by the fusion of haploid gametes from *M. acuminata* and triploid gametes of Gros Michel, formed as the result of the suppression of the first meiotic division

871. WILSON, G. B. 634.771:576.354.4:576.356.5:576.16
Cytological studies in the Musae. III. Meiosis in some seedling clones.
 Genetics 1946 : 31 : 483-93.

Investigations on the meiosis of tetraploid and diploid seedlings derived from the cross Gros Michel x *M. acuminata* are reported. The diploid seedlings examined proved to be as meiotically normal as the naturally occurring diploids described in the second paper of this series (cf. Abst. 870). The data on chromosome pairing in the tetraploid progeny suggest that all three chromosome sets of Gros Michel are "*acuminata*" types. The observations on chromosome homology in Gros Michel (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1911) and the complete chromosome pairing in the diploid progeny of Gros Michel x *M. acuminata* are also regarded as favouring the hypothesis that Gros Michel is essentially a triploid form of *M. acuminata*; although, it is pointed out, genetically Gros Michel may differ widely from any triploid derived experimentally from the present-day varieties of *M. acuminata* on account of the very long period of human selection it has undergone.

A discussion is given of the possible value of the diploid seedlings of the cross Gros Michel x *M. acuminata* in the production of a suitable male parent for use in breeding disease resistant forms of Gros Michel.

872. VÉLEZ, I. 634.774(87)
Wild pineapples in Venezuela.
 Science 1946 : 104 : 427-28.

Interesting data are given on the several wild and cultivated varieties of pineapple of Venezuela. These are of potential interest to plant breeders on account of such characters as thornlessness, high seed yield, good quality and large fruit size.

873. AGETE, F. 634.774:581.6(72.91)
 La piña. (**The pineapple**).
 Rev. Minist. Agric. Cuba 1945 : 28 : No. 2 : 24-32, 65-67.

Information is included on the economic characteristics and chemical composition of the two Cuban varieties Piña Morada de Cuba (Purple Cuban pineapple) also known as Red Spanish, and Piña Blanca (White pineapple), also known as Piña de la Tierra (Native pineapple), Piña de Puerto Rico or Sugar Loaf.

874. 634.8:575(74.7)
Hybrid grapes.

J. N.Y. Bot. Gdn 1946 : 47 : p. 280.

Work at the New York Experimental Station on new seedless grape varieties receives brief mention. One of the seedless grapes now under commercial test is known as Interlaken Seedless.

875. SOUSA, J. S. I. DE 634.835(81)
 É possível a cultura de uvas finas para mesa em São Paulo? (**Is it possible to grow high quality dessert grapes in São Paulo?**)
 Rev. Agric. Piracicaba 1946 : 21 : 249-63.

This article includes descriptions of dessert grape varieties suitable for São Paulo, including five Pirovano varieties.

876. 634.84:575(74.7)
Nationwide fruits. Grapes.

Amer. Fruit Gr. 1946 : 67 : No. 6 : p. 24.

Brief mention is made of three new grape varieties, Schuyler, Steuben and Interlaken Seedless, developed at the New York Experiment Station. Schuyler, an early black grape, is a seedling of Zinfandel crossed with Ontario; it ripens about 25 days earlier than Concord, but is not as hardy as Ontario or Concord. Steuben has been developed from a cross between Wayne and Sheridan. It is a black-fruited, heavily bearing variety, and appears to possess marked resistance to mildew and black rot. Interlaken Seedless is the product of a cross between Ontario and Thompson Seedless. When fully ripe its fruit are a rich golden yellow colour, and high in sugar content; in hardness Interlaken Seedless resembles Seneca, Schuyler and Delaware.

877. LOOMIS, N. H. 634.84:581.6(73)

Drying of American-type grapes.

Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 195-98.

The suitability of American grapes for raisin production was investigated. Twenty-two varieties are described as fairly acceptable for the purpose, of which the Seneca variety was found to yield the most palatable raisins, with a texture similar to that of raisins obtained from *Vitis vinifera* grapes. Muscadine grapes only yielded hard and unpalatable raisins, although several methods of preparation were used.

878. LUTTRELL, E. S. 634.848.1-2.421.9-1.521.6

Black rot of muscadine grapes.

Phytopathology 1946 : 36 : 905-24.

Information is given on the varietal susceptibility of muscadine grapes (*Vitis rotundifolia* Michx) to black rot. The fungus responsible for this disease is regarded as a new form of *Guignardia Bidwellii* (Ell.) Viala et Ravaz, the cause of black rot on bunch grapes, and it has been named *G. Bidwellii* f. *muscadinii*.

FORESTRY 634.9

879. S., J. R. 634.97:575(73)

Forest genetics research at the Arboretum.

Morris Arbor. Bull. 1946 : 4 : 49-50.

The Forest Genetics Project, originally started at the Northeastern Forest Experiment Station, New Haven, Conn., has been transferred to the Allegheny Forest Experiment Station. The breeding work under this scheme is now centred at the Morris Arboretum.

880. WATROUS, R. C. and

BARNES, H. V.

634.972.1:016

Bibliography on cork oak.

Bibliogr. Bull. U.S. Dep. Agric. 1946 : No. 7 : Pp. 66.

In addition to papers on cultural and technological subjects, the bibliography includes references on the taxonomy, geographical distribution, diseases, and improvement of the cork oak.

881. ESSON, J. G. 634.972.1:575.061.1

Fastigiata oak reproduced from seed.

J. N.Y. Bot. Gdn. 1946 : 47 : 275-78.

It is reported that three acorns collected from a *Quercus Robur fastigiata* tree produced two ordinary English oaks with a spreading habit and a fastigiata form similar to the parent oak.

882. JOHNSON, H. 634.972.6:581.162.32:576.356.5:575.127.2

Progeny of triploid *Betula verrucosa* Erh.

Bot. Notiser 1946 : No. 2 : 285-90.

Data are given on the fertility of the progeny obtained by crossing autotriploid *B. verrucosa* with another autotriploid *B. verrucosa*, with diploid *B. verrucosa*, with the tetraploid species *B. pubescens*, and with the F_1 triploid of *B. pubescens* x *B. verrucosa*. In general the fertility of the triploids was very low; the cross involving the two autotriploids gave in one direction 12.45% of fruits with embryos; and the cross between autotriploid *B. verrucosa* x diploid *B. verrucosa* gave 21.80% such fruits.

Chromosome counts of the progenies showed that the somatic chromosome number ranged between 29 and 51, all numbers being represented with the exception of 43 and 47. The most frequent chromosome numbers fell within the ranges $2n = 29-37$ and $2n = 48-51$. The triploid progenies exhibited marked variability in vigour and morphological characters, although the majority of the plants were very small. No relationship between leaf characters and chromosome number could be established.

883. CHEVALIER, A. 634.972.8-2.421.9-1.521.6:582(44)

Les ormes de France. (The elms of France).

Rev. Bot. Appl. 1942 : 22 : 429-59.

A taxonomic account is given of the French elms. Notes are included on susceptibility to *Cerastostomella Ulmi*.

884. **Edmundo Navarro de Andrade.** 634.973:007(81)

Bol. Soc. Brasil. Agron. Rio de J. 1941 : 4 : 373-76.

This obituary notice of Dr Navarro de Andrade includes a reference to his researches on *Eucalyptus* and other forest trees.

885. GUINIER, P. 634.975:581.44:575.242
Arbes et forêts. Notes botanico-forestières II.—Sapins sans branches.
(**Trees and forests. Botanical forestry notes. II.—Firs without branches**).

Rev. Eaux For. 1944 : 316-18.

A mutant fir is described from Bertrichamps, Meurthe-et-Moselle, devoid of lateral branches. Other similar occurrences are noted from the literature.

886. CHEVALIER, A. 634.975:582(59.7)
Notes sur les conifères de l'Indochine. (**Notes on the conifers of Indo-**
china).

Rev. Bot. Appl. 1944 : 24 : 7-34.

In this review of Indochinese conifers, two new species are described: *Pinus langbianensis* and *P. tonkinensis*. *P. Kremppii* is transferred to the new genus *Ducampapinus*.

VEGETABLES 635

887. **Gribovo selectionists.** 635:575(47)

Agricultural Chron., Moscow 1946 : No. 4 : 2-3. (Mimeographed).

A brief account is given of the extensive vegetable breeding work of the Gribovo Station which was established in 1920. Mention is made of the following vegetable varieties: Moscow Late, Byelorussian, Number One and Gribovo Glory cabbages; Nant Gribovo carrot; Claret and Incomparable beets; Large White Winter, Large Black Winter and Graivoron radishes; the cold resistant early maturing tomatoes bred by A. Alpatyev, which can be planted directly out-of-doors, and the Alpatyev Shtambovy tomato requiring no stakes for support or off-shoot pruning; and the Pogar, Rostov, Arzamas and Myachkov onions, which store exceptionally well.

888. **A Bulgarian Burbank.** 635:575:007(49.7)

Free Bulgaria 1947 : 2 : No. 1 : p. 14.

A note is given on the vegetable breeding work of C. Daskalov.

889. WELLENSIEK, S. J. 635:575.42:578.08
Selectieschema's voor groentegewassen. (**Selection schemes for vegetables**).

Meded. Inspecteur Tuinbouw Tuinbouwonderwijs, Wageningen 1943 : 605-10.

This paper, which is an abbreviated report of an introductory address at a meeting on the study of vegetable improvement, held at Utrecht, October 1943, comprises the substance of several chapters on breeding technique from the author's text-book on the principles of plant breeding reviewed in *Plant Breeding Abstracts*, Vol. XVI, p. 365.

The present report treats (1) the different stages in breeding, and (2) the breeding schemes and methods suited to various types of plant, taking into consideration whether the plant concerned is perennial or annual, whether capable of vegetative reproduction, cross or self pollination, and whether undesired types can be eliminated before the flowering stage.

890. KRAMER, A. 635.00.14:578.087
Relation of maturity to yield and quality of raw and canned peas, corn and lima beans.

Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 361-67.

Data are given indicating that the yields of vegetables such as peas, Lima bean and sweet corn, may vary considerably with different stages of maturity. It is suggested that, in

the case of crops harvested in the immature stage, an index of maturity, such as that provided by the "tenderometer" or "succulometer", for example, should be used in yield recording, particularly in varietal tests.

891. BERGER, C. A. 635.25:576.356.5
Naturally occurring polyploidy in the development of *Allium cepa* L.

Biol. Bull. Wood's Holle 1946 : 91 : p. 217. (Abst.).

The formation and division of tetraploid cells in seedlings of *Allium Cepa* between 20 and 40 mm. long are reported. Such cells occur throughout the cortex of the cotyledon and in the intermediate region between the root and shoot; they have not been observed in the root. The mitotic behaviour of the cells is described.

892. SPARKS, W. C. and
 BINKLEY, A. M. 635.25:581.162.32
Natural crossing in Sweet Spanish onions as related to distance and direction.

Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 320-22.

A report is given of investigations on the amount of natural crossing occurring between the White Sweet Spanish and Yellow Sweet Spanish onions, grown in two commercial fields 30 feet apart.

893. MURPHY, J. B. 635.26:581.3
Megasporogenesis and development of the embryo sac of *Allium cernuum*.

Bot. Gaz. 1946 : 108 : 129-36.

An investigation on the megasporogenesis and development of the embryo-sac in *A. cernuum* is reported. The haploid chromosome number was determined as $n = 8$.

894. DAVIS, J. F. 635.34:519.271.3
A comparison of methods for harvesting experimental plots of cabbage.

Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 327-30.

Comparative investigations on methods of sampling yields of experimental cabbage plots are reported. Methods in which estimates of yield are based on a certain number of heads harvested systematically, for example, by harvesting every fifth head, were found to be promising.

895. LORENZ, O. A. 635.34:581.143.26.02(73)
Response of Chinese cabbage to temperature and photoperiod.

Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 309-19.

In view of the difficulties encountered in producing the Chinese cabbage, *Brassica pekinensis*, in California, the following investigations have been carried out: (1) observations on the growth behaviour of several varieties and strains planted each month throughout the year; (2) greenhouse experiments on the effect of temperature and day length upon the flowering of three strains; and (3) experiments on the effect of low temperature on the production of flower stalks in the Pe Tsai strain. The results show that the crop should be cultivated in regions where the days are short, and the temperatures are sufficiently low to allow the development of heads with good quality but not so low as to induce early flowering. The crop is therefore suitable for late summer and early autumn planting in the northern states, and winter planting in the southern states.

896. CALDWELL, J. S.,
 CULPEPPER, C. W.,
 EZELL, B. D.,
 HUTCHINS, M. C. and
 WILCOX, M. S. 635.347:581.6
The dehydration of kale.

Canner 1945 : 101 : No. 25 : 13-14, 16, 28, 30, 32.

The Dwarf Blue Curled Scotch, Dwarf Green Scotch and Dwarf Siberian (Dwarf German Green) kale varieties were dehydrated by different treatments. All samples of the first

two named varieties were very good and excellent in quality after two months' storage-samples of Dwarf Siberian were slightly less satisfactory in both colour and flavour. Information is given on the carotene and ascorbic acid contents of the dehydrated product; and of the leaves at different stages of development.

897. CALDWELL, J. S.,
EZELL, B. D.,
CULPEPPER, C. W.,
WILCOX, M. S. and
HUTCHINS, M. C. 635.41:581.6

Variety, its effect on dehydrated spinach.

Canner 1945 : 101 : No. 9 : 12-14, 22 : No. 10 : 22-24, 26, 32; No. 11 : 20, 22.

Experiments on the dehydration of 25 varieties of spinach are reported. The cooked material was graded for colour and general appearance, texture, flavour, and general suitability. All the material was found to have an acceptable palatability. The following varieties were rated as being the best in quality: Harlem Market, Extra Large Leaved Savoy, Gould's Round Thick Leaf Savoy, Virginia Savoy, Dreer's Reselected Savoy, Long Standing Bloomsdale, Hollandia, Prickly Winter, Flanders Broad Leaf and Old Dominion. Varietal differences in carotene and ascorbic acid content were noted.

898. CHEVALIER, A. 635.48:582
Les rhubarbes cultivées en Europe et leurs origines. (**The rhubarbs
cultivated in Europe and their origins**).
Rev. Bot. Appl. 1942 : 22 : 474-85.

This taxonomic account describes the various species of rhubarb used for medicinal or culinary purposes. Special attention is paid to Russian forms.

899. CHEVALIER, A. 635.5:576.16
Laitues, chicorées et pissenlits. L'origine des formes cultivées. (**Let-
tuces, chicory and dandelions. The origin of the cultivated forms**).
Rev. Bot. Appl. 1943 : 23 : 273-81.

A brief account is given on the origins of present-day varieties of lettuce, endive, chicory and salad dandelion.

900. TOWNSEND, G. R., 635.53-2.484-1.521.6:575.12
EMERSON, R. A. and 635.53:575.11.061.6
NEWHALL, A. G. 635.53:581.44:575.11
**Resistance to *Cercospora apii* Fres. in celery (*Apium graveolens*
var. *dulce*).**
Phytopathology 1946 : 36 : 980-82. (Abst.).

Promising celery selections resistant to *Cercospora Apii* Fres. have been obtained from crosses between Cornell 19 and resistant Turkish celeries. The resistance of these hybrid selections appears to be due to more than a single gene. In general green plants are more resistant than self-blanching types.

Green colour of the petioles was found to be dominant to the self-blanching character, and due to a single factor. The intensity of the green colour appears to be determined by modifiers.

The character of hollow petioles or pithiness showed complete dominance in the F_1 . F_2 data suggested that pithiness is conditioned by a single gene, but that the expression of dominance may be affected by modifying factors under certain environmental conditions. The red colour occurring in the petioles of some lines was found to be inherited as a simple dominant.

901. PRYOR, D. E.,
WHITAKER, T. W. and
DAVIS, G. N. 635.611-2.421.1-1.521.6:575(79.4)
The development of powdery mildew resistant cantaloupes.
Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 347-56.

Cantaloupes resistant to races 1 and 2 of powdery mildew (*Erysiphe Cichoracearum* DC.) have been developed in California by using the resistance of introduced selections of

Cucumis Melo from India. The breeding work, which has produced Powdery Mildew Resistant Cantaloupes No. 5, No. 6 and No. 7, is described in detail (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 1031, and XVI, Abst. 1432).

902. MUNGER, H. M. 635.611-2.484-1.521.6:575(74.7)
Iroquois muskmelon is resistant to *Fusarium* wilt.
 Fm Res. N.Y. St. Sta. 1944 : 10 : No. 2 : p. 20.

The Iroquois variety of musk-melon (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 609) was selected from a cross between Minnesota Selection 99-36 and Bender's Surprise; the former parent was derived from a cross between Honey Dew and Bender's Surprise. Iroquois has proved to be highly resistant to *Fusarium* wilt under conditions in New York. In appearance Iroquois is similar to Bender's Surprise; in fruit size it equals the smaller fruited strains of this variety.

903. CARSON, C. M. 635.615:575(73)
Icebox Number Two.
 Sth Seedsman 1946 : 9 : No. 12 : p. 11.

A new water-melon, which is conveniently small, has been developed by the firm of Lawrence Robinson and Sons, Modesto, California. It is described as white fleshed, early and prolific.

904. YOUNG, R. E. 635.62(73)
The Butternut squash.
 Flower Gr. 1945 : 32 : p. 192.

The Butternut squash is described. Information is given on its performance in Massachusetts and New England. It is conveniently small and has good culinary qualities. It produces a vigorous vine and is high yielding. It appears to be able to withstand drought, and shows resistance to borer attack. The Butternut squash does not, however, store satisfactorily after Christmas.

905. MILLÁN, R. 635.62:576.16:582
 Los zapallos Bugango y Angola. (**The Bugango and Angola squashes**).
 Rev. Argent. Agron. 1943 : 10 : 192-96.

Descriptions are given of the Bugango squash of Uruguay and the Angola squash of Argentina. These are probably one and the same variety and are believed to have been introduced from Africa. They should probably both be classified under *Cucurbita Pepo*.

906. SCOTT, D. H. and
 RINER, M. E. 635.62:581.162.51:575.11
Inheritance of male sterility in winter squash.
 Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 375-77.

Male sterile plants of *Cucurbita maxima* Duch. were observed in seven different lines whose parentage involved the Golden Hubbard and Tapley varieties. The androecium aborts in the bud stage of the staminate flowers of these male sterile plants. When sibbed with pollen from normal male fertile plants, seed is produced abundantly by the sterile plants. The character of male sterility is inherited as a simple recessive; the gene pair concerned has been designated *Ms ms*. The possible value of the character in the production of F_1 hybrid seed is pointed out. In this connexion it is interesting to note that the male fertile plants tend to flower a few days earlier than the male sterile forms.

907. JENKINS, J. M. (JUN.) 635.63-2.411.4-1.521.6:575
Studies on the inheritance of downy mildew resistance and of other characters in cucumbers.
 J. Hered. 1946 : 37 : 267-71.

Information is given on the segregation for reaction to *Peronoplasmopara cubensis* (B. et C. Clinton) shown by the F_1 and F_2 populations of cucumber crosses between the resistant Puerto Rico No. 37 and the susceptible Minnesota No. 7.36. Promising resistant segregates were obtained. It was found that inoculation in the seedling stage gave a good indication of field resistance.

Downy mildew resistance showed no association with spine colour, the colour of the mature

fruit, netting, and the texture or colour of the spines. F_2 data indicated that indeterminate plants tended to be less susceptible to downy mildew than determinate. The red colour of the mature fruit was closely associated with hard rind, and cream colour of the mature fruit with soft rind.

908. BARNES, W. C.,
CLAYTON, C. N. and
JENKINS, J. M. (JUN.) 635.63-2.411.4-1.521.6:575(75.7)

The development of downy mildew-resistant cucumbers.

Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 357-60.

In breeding cucumbers for downy mildew resistance, the susceptible commercial variety A and C was crossed with the resistant varieties Puerto Rico 37 and Chinese Long. Cubit and Marketer were also crossed with the resistant cucumber Puerto Rico 40. An account is given of the performance of promising selections derived from these crosses.

909. 635.64:575.12(81)
Turrialba, new Latin American tomato, is a "quickie".
Canner 1945 : 101 : No. 26 : p. 16.

An account is given of the breeding of the new Turrialba tomato variety (cf *Plant Breeding Abstracts*, Vol. XVI, Abst. 1439).

910. BROWN, G. B. and
BOHNS, G. W. 635.64:577.16(78.7)
Ascorbic acid in fruits of tomato varieties and F_1 hybrids forced in the greenhouse.

Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 255-61.

Significant differences in ascorbic acid content were shown by varieties and F_1 hybrids of the tomato. The data suggested that F_1 hybrids do not possess higher ascorbic acid contents than varieties. In the case of the varieties the negative correlation obtained between mean fruit weight and mean ascorbic acid content was not significant with regard to variety, experimental block or harvesting date, suggesting that undetermined environmental factors were more important causes of correlations between fruit weight and ascorbic acid content than genetic factors. In the case of the F_1 hybrids, however, the negative correlation found between fruit weight and ascorbic acid content could be attributed to differences between the hybrids. The importance of carefully considering the various environmental factors in genetical and breeding work on ascorbic acid content is emphasized.

911. ISBELL, C. L. 635.64:581.165
Further observations on and the application of propagating cabbage by leaf cuttings.

Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 335-39.

A method of propagating cabbage by leaf cuttings is described, which is considered valuable as a means of increasing stock and sowing selections in seasons when seed production is not possible.

912. REYNARD, G. B. 635.64:581.48:575.11
Polycotyledony in the genus *Lycopersicon*.
Abstr. Diss. Univ. Md 1944 : 41 : No. 6 : 17-18. (Abst.)

Information is given on the occurrence of polycotyledony in the genus *Lycopersicon*. Three types of polycotyledonous lines were isolated, which produced normal seedlings, a low percentage of polycotyledons, and a high percentage of polycotyledons, respectively. The data obtained from appropriate crosses between these types indicated that polycotyledony is a quantitatively inherited character, and that at least three pairs of genes are operative. The various forms of polycotyledonous seeds did not produce their own phenotype exclusively, but also gave rise to all other forms; the tricotyledon was the most common. The wide variation observed suggested that several modifying genes were present.

913. FRAZIER, W. A.,
KIKUTA, K.,
McFARLANE, J. S. and
HENDRIX, J. W. 635.64-2-1.521.6:575(96.9)

Tomato improvement in Hawaii.

Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 277-84.

An account is given of the tomato breeding programme begun in 1941 at the Agricultural Experiment Station, Honolulu. The programme includes breeding for resistance to *Stemphylium*, *Fusarium*, spotted wilt, mosaic and nematodes, and for high vitamin C content. Detailed accounts of the investigations on breeding for a combination of nematode resistance and high vitamin C content, resistance to spotted wilt, and resistance to *Stemphylium* are presented in separate papers (cf. Absts 917 and 919 respectively). Selections of complex crosses exhibit promising combined resistance to spotted wilt, *Fusarium* wilt and *Stemphylium*. The possibility of developing large-fruited, heavy-yielding tomatoes of high quality, homozygous for resistance to these three diseases, appears to be a definite possibility.

The use of F_1 hybrids to increase yields and obtain disease resistance is also under investigation.

914. ANDRUS, C. F. 635.64-2.411.4-1.521.6(75.7)
Resistance of tomato varieties to late blight in South Carolina.
Plant Dis. Reporter 1946 : 30 : 269-70. (Mimeographed).

About 40 commercial varieties of tomatoes are broadly classified for their reaction to *Phytophthora infestans*. Of these varieties, 17 are listed as resistant.

915. FOSTER, H. H. and 635.64-2.411.4-1.521.6(76.2)
CAMPBELL, J. A. 635.64-2.484-1.521.6(76.2)

Observations on Mississippi tomato diseases during 1946.

Plant Dis. Reporter 1946 : 30 : 339-42. (Mimeographed).

It is mentioned that three lines developed in the Southern Tomato Exchange Programme, designated STEP 9, 22 and 23, appeared to be somewhat resistant to late blight during the 1946 season. STEP 22 exhibited the highest degree of resistance among the three lines, both to late blight and *Alternaria*. Certain F_2 interspecific crosses received from Beltsville, Maryland, showed a higher degree of resistance to the diseases than STEP 22. Bushy secondary growth appears to be associated with resistance to these leaf blights, but it is doubtful whether this character can be relied upon to confer a sufficient degree of resistance in breeding work.

916. BLOOD, H. L. 635.64-2.484-1.521.6:575(79.2)
Breeding for wilt resistance in the tomato.

Fm Home Sci., Utah 1946 : 7 : No. 3 : 3, 14-16.

Tomato breeding for resistance to *Verticillium* wilt in Utah is described. Highly resistant selections have been developed from crosses between resistant wild tomatoes from South America and susceptible commercial varieties. The most promising of these selections are being out-crossed to early maturing varieties with satisfactory commercial qualities. The first year's results are, however, described as discouraging. The value of pedigree hybrids in breeding for *Verticillium* wilt resistance is being investigated.

917. HENDRIX, J. W.,
KIKUTA, K. and
FRAZIER, W. A. 635.64-2.484-1.521.6:575(96.9)

Breeding tomatoes for resistance to gray leaf spot in Hawaii.

Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 294-300.

In extensive field and greenhouse tests of resistance to *Stemphylium Solani* Weber, carried out at the Hawaii Agricultural Experiment Station, Honolulu, resistance was shown by three small-fruited selections of the cross *Lycopersicon pimpinellifolium* x *L. esculentum*, introduced from the United States Department of Agriculture, and by five selections received from the Experiment Station of the Hawaii Sugar Planters' Association. The latter selections involved three *Lycopersicon* species in their parentage.

Resistant lines were crossed with commercial tomatoes. Over 20 selections have been obtained showing a promising combination of resistance to grey leaf spot, large fruit size and high yielding capacity. Of these the HES selections 1887, 1930, 1939 and 1940 are outstanding.

918. MCFARLANE, J. S.,
HARTZLER, E. and 635.64-2.6-1.521.6:575.127.2(96.9)
FRAZIER, W. A. 635.64:577.16:575.127.2(96.9)
Breeding tomatoes for nematode resistance and for high vitamin C content in Hawaii.

Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 262-70.

Interspecific hybrids between *Lycopersicon esculentum* and *L. peruvianum* were obtained by the use of an embryo culture technique, but only the hybrid T1427, derived from the cross [(*L. hirsutum* x Bonny Best) x (Bounty x BC-10)] x *L. peruvianum* (P.I. No. 128645), set fruit, each of which produced on the average two or three viable seeds. The F_1 was cross-sterile with *L. esculentum*, and attempts to make crosses by embryo culture have so far been unsuccessful. The F_2 population segregated for nematode resistance, vigour and several other characters. A successful cross between *L. esculentum* and an F_2 segregate has resulted in a nematode susceptible plant.

F_5 selections of a cross between Michigan State Forcing and *L. peruvianum*, the seed of which was obtained from the New Hampshire Experimental Station, did not show a high degree of nematode resistance; their fruit quality and size were also unsatisfactory.

Marked variation in nematode resistance has also been observed within *L. peruvianum*; selections have been obtained which show no galls in heavily inoculated soil.

The ascorbic acid content of all the F_5 selections of the cross Michigan State Forcing x *L. peruvianum* was higher than in the standard varieties Bounty and Pearl Harbor, but considerably lower than in *L. peruvianum*. The ascorbic acid content of the interspecific hybrid T1427 was intermediate between that of the two parents.

Data on the inheritance of reaction to nematodes suggest that resistance is dominant to susceptibility.

Methods of utilizing the nematode resistance and high vitamin C content of *L. peruvianum* are discussed.

919. KIKUTA, K. and
FRAZIER, W. A. 635.64-2.8-1.521.6:575(96.9)
Breeding tomatoes for resistance to spotted wilt in Hawaii.
Proc. Amer. Soc. Hort. Sci. 1946 : 47 : 271-76.

Additional information is given on the spotted wilt resistant tomato, Pearl Harbor, a variety recently developed at the Agricultural Experiment Station, Honolulu (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 986). Pearl Harbor has been crossed with several other commercial varieties in the attempt to improve its fruit size. The line HES 1383, selected from the cross (Pearl Harbor x Bounty) x (Pearl Harbor x Pritchard) shows particular promise of combining spotted wilt resistance and increased fruit size. Further testing and selection of promising material is, however, necessary.

The spotted wilt resistance of Pearl Harbor appears to be due to a single dominant gene.

920. CALDWELL, J. S.,
CULPEPPER, C. W.,
HUTCHINS, M. C.,
EZELL, B. D. and
WILCOX, M. S. 635.648:581.6
The dehydration of okra: variety and stage of maturity as factors in determining quality.

Canner 1945 : 101 : No. 17 : 14-16, 22-24, 26.

Dehydration experiments on the following varieties of okra are reported: Clemson Spineless, Dwarf Prolific, First Choice, White Velvet, Louisiana White Velvet, Louisiana Green Velvet and Perfected Perkins. The general conclusion was reached that the quality of the dehydrated product is determined to a considerably greater extent by the stage of development than by variety.

921. GUILLOCHON, L. 635.65(61.1)
 Les Légumineuses alimentaires de Tunisie. (**Edible leguminous plants of Tunisia**).
 Rev. Bot. Appl. 1940 : 20 : 389-402.

This survey of Tunisian beans, lentils and peas includes short notes on local varieties.

922. WOODBURY, G. W. 635.65:581.6:575
Selection of beans and peas for processing.
 Canner 1945 : 100 : No. 8 : 48-50.

The problems of selecting pea and bean varieties suitable for freezing and canning are discussed.

923. 635.652:575(73)
 635.67:575(73)

Two more All-America's.

Sth. Seedsman 1947 : 10 : No. 1 : p. 15.

Descriptions are given of the new Ranger snap bean variety and the Erie sweet corn, which have been developed by Associated Seed Growers.

Ranger is a Refugee type of snap bean, but is described as differing in its spreading habit and half-runners, higher yield and disease resistance.

The Erie sweet corn is a yellow kernelled hybrid, with a wide adaptability. It is wilt resistant and fairly drought resistant. Compared with Golden Cross Bantam, it grows six inches taller, and matures three to four days later.

924. MAGRUDER, R. and 635.653:575(73)
 WESTER, R. E.
A preview of two new bush lima beans.
 Canner 1945 : 101 : No. 2 : p. 20.

The two new Lima bean varieties, at present known as 243 and 343, are reported to be under test during the 1945 season. A list is given of the experiment stations concerned in the trials. The varieties are suitable for canning and freezing purposes.

925. 635.653-2.6-1.521.6:575(79.4)

Westan: nematode-resistant lima bean from California.

Sth. Seedsman 1947 : 10 : No. 1 : p. 44.

A brief account is given of the nematode resistant Westan variety of Lima bean, produced in California.

926. CHEVALIER, A. 635.654:576.16:582(6)
 Le dolique de Chine en Afrique. Son histoire. Ses affinités. Les formes sauvages et cultivées. Son rôle dans l'alimentation indigène et en agriculture tropicale et subtropicale. (**The cowpea in Africa. Its history. Its affinities. The wild and cultivated forms. Its role in the native diet and in tropical and subtropical agriculture**).
 Rev. Bot. Appl. 1944 : 24 : 128-52.

A review is presented of the history and taxonomy of *Vigna sinensis* sensu lato and of African species related to it. Four new species are described: *V. nigerica*, *V. senegalensis*, *V. pusilla* and *V. Tisseranti*. Cultivated varieties are listed from west Africa, Oubangui and the Chari basin.

927. KOCH, L. 635.655:575(49.2)
Breeding soybeans for Holland.
 Soybean Digest 1946 : 7 : No. 2 : 13, 24.

Experiments on the production of soya beans suitable for cultivation in Holland are described.

928. 635.655:581.47:575(47)

New varieties of soya bean.

Soviet News 1947 : No. 1636 : p. 4.

New breeding stations have been set up in Russia for developing improved soya bean varieties. Types have been produced bearing pods on the upper part of the stem, thus facilitating mechanized harvesting.

929. COON, B. F. 635.655-2.7-1.521.6
Resistance of soybean varieties to Japanese beetle attack.
 J. Econ. Ent. 1946 : 39 : 510-13.

Tests of the reaction of 26 soya bean varieties to Japanese beetle attack are reported. All varieties showed susceptibility, but Chief, Viking, Illini and Wilson 5 could be considered as moderately resistant. Late maturing varieties recovered from the beetle injury by continuing growth after the disappearance of the pest; early varieties failed to show this recovery.

930. HUMPHREY, L. M. 635.655.00.14(76.7)
New high yielding soybean varieties for the south.
 Soybean Digest 1946 : 7 : No. 2 : 11-12.

The results of trials of 37 soya bean varieties at the Robert L. Dortch Seed Farms, Arkansas, are reported.

931. ANDERSON, M. E. 635.656:575(73)
Two new wilt-resistant pea varieties for processors.
 Canner 1946 : 102 : No. 6 : p. 22.

The new Rogers Early Perfection pea variety was bred from a cross between Premium Gem and Rogers Climax. It matures a week earlier than Perfection, and has inherited the *Fusarium* wilt resistance of Rogers Climax. It is very suitable for canning, particularly on account of its slowness in changing from a sweet to a starchy condition in the canning process.

The new Rogers Wilt Resistant Thomas Laxton No. 251 has been developed from a cross between Thomas Laxton and Resistant World's Record. It ripens at the same time as Thomas Laxton; it is wilt resistant and suitable for canning. It is less affected by adverse environmental conditions than Thomas Laxton and is higher yielding. No. 251 also produces far fewer rogues of the type known as "skeleton vine" or "rabbit ear" than Thomas Laxton.

932. ROSEN, G. VON 635.656:575.11:575.127.2
 Artkreuzungen in der Gattung *Pisum* insbesondere zwischen *P. sativum* L. und *P. abyssinicum* Braun. (**Interspecific crossings in the genus *Pisum* in particular between *P. sativum* L. and *P. abyssinicum* Braun.**)
 Berlingska Boktryckeriet, Lund 1944 : 261-400.

A comprehensive genetical, cytological and taxonomic study has been made of *P. sativum*, *P. abyssinicum* and their hybrid progeny.

Corresponding gene loci could be found in both species, the order of these being roughly the same in both. *P. abyssinicum* differs from *P. sativum*, however, in a reciprocal translocation and in an inversion in one of the translocated chromosomes.

A new recessive gene *up* determining one pair of leaflet per leaf is described.

Slight differences between reciprocal crosses are attributed to defective co-operation between the chromosomes and the plasma. Two anomalous phenomena which are discussed in some detail are varying linkage and the occasional appearance of cross-over values in excess of 50%.

The author concludes that the two species differ essentially in their polygene complements, and are justifiably regarded as disjunct taxonomic entities.

933. DAHL, E. 635.656:575.114
 Brytmärgärter. (**Marrow fat peas with thick pods**).
 Fruktdolaren 1946 : No. 2 : 60-61.

This is a note recommending the Kungs pea, a marrow fat type of French origin with a thick edible pod. Other newer varieties of this type include Aurora, Olympia and Alnarp Artemis. Some varieties tend to segregate an occasional garden type with thin pods with tough membranes.

934. NOVIKOV, V. V. 635.656:575.115:581.162
(Hybrid peas obtained by pollinating, situated on different parts of the stem).

Sovetskaja Botanika (Soviet Botany) 1945 : 13 : No. 5 : 24-27.

As a result of reciprocal crosses between Victoria Mansdorf and Alaska 033, it was found that, in the plants of the F_1 progeny, the characters of the pollen parents predominated if the pollen was characterized by a high degree of inherent vigour, while the characters of the maternal plants predominated, if the flowers of the latter were situated in the middle part of the stem and were not either too low or too high. The condition of the flowers which produce both the pollen and the seed must therefore be taken into account.

I. Z.

935. GRÉEN, S. 635.656:582
 En titt på trädgårdsärterna. **(A glance at the garden peas).**
 Fruktdollaren 1945 : No. 2 : 68-70.

Definitions are given of the different types of shelling pea and the edible-podded and sugar peas, and the various possible combinations of these types, with notes on cultural requirements.

The edible-podded sugar pea, which arose by a mutation, was developed and ultimately put on the market as the Roi de Gourmands by Vilmorin. This variety proved too delicate for Swedish conditions, but by selection, the Kungsärt (King's pea) was obtained and ultimately perfected by crossing at Weibullsholm with the marrow-fat type. The resulting three varieties of marrow-fat sugar peas included one particularly early pea specially intended for regions with a short vegetation period.

936. 635.656-2.8-1.521.6:575

What is the Delwiche Commando pea like?

Canner 1945 : 102 : No. 2 : 13-14.

The Delwiche Commando pea variety (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1463) was bred from a cross between Admiral and Pride, the latter variety being derived from a cross between Wisconsin Perfection and Onward. The variety is resistant to the common wilt and near wilt diseases. It is medium late in maturity, maturing at the same time as Wisconsin Perfection. It also resembles this variety in plant height, pod characteristics and yielding capacity; it is suitable for canning. Delwiche Commando has also been crossed with other commercial varieties to introduce near wilt resistance into early and late varieties.

A brief account is given of the pea breeding work of E. J. Delwiche, the breeder of several wilt resistant varieties suitable for canning.

937. SMITH, G. M. 635.67:575.12(77.2)
Improved Golden Cross Bantam and Purgold sweet corn.
 Bull. Ind. Agric. Exp. Sta. 1946 : No. 513 : Pp. 4.

Descriptions are given of the improved inbreds, Purdue 51B and Purdue 39A, which are recommended to produce the improved Golden Cross Bantam hybrids in the combination Purdue 39A x Purdue 51B. Purdue 51B has been released to meet the demand for taller plants more suitable as pollen parents. Purdue 39A produces cobs with more kernel rows than the original Purdue 39. The improved Golden Cross Bantam produces taller ears, cobs with a few more kernel rows, higher yield and fewer tillers than the former Golden Cross Bantam.

An improved form of Purgold has also been obtained by the cross Purdue 39A x Purdue 14. Purgold is similar to Golden Cross Bantam in most characters, but Purgold is more heat and drought resistant than Golden Cross Bantam.

938. HOROVITZ, S.,
 MARCHIONI, A. H. and
 FISHER, H. G. 635.67:581.6:575.115
 Mejoramiento del maíz dulce para la industria del envasado. Aumento del contenido de azúcar. **(Improvement of sweet maize for the liquor trade. Increasing the content of sugar).**

"Granos" Semilla Selecta, B. Aires 1942 : 6 : Nos 10-12 : p. 23.

A newly discovered sugar gene su_x , located in chromosome 6, is reported; it also brings

about a slight roughness in the grain. When homozygous, su_x converts su_1 into a dominant gene, and should be useful on account of the high sugar content, up to 13.8%, which it effects in conjunction with su_1 .

939. MOLL, A. C. 635.67.00.14(77.1)
Evergreen type hybrids lead in Ohio sweet corn trials.

Canner 1945: 102: No. 3: p. 12.

Trials in 1945 of 20 golden and 12 white sweet corn hybrids at Columbus, Ohio, are described. Iogreen 16 and Iogreen 56 outyielded all the other hybrids tested.

940. SMITH, G. M. and
 BRUNSON, A. M. 635.677:575.12(77.2)
Hybrid popcorn in Indiana.

Bull. Ind. Agric. Exp. Sta. 1946: No. 510: Pp. 18.

Indiana is becoming increasingly important as a popcorn producing state, and in 1945 it was second to Iowa in total production. Descriptions are given of the inbreds and Purdue hybrids now in commercial use, including one South American inbred, SA 24, and four Supergold inbreds, Sg 32, Sg 16, Sg 30A and Sg 18, from the parents of the single and three-way Purdue hybrids. The use of second generation seed is not recommended. Methods of determining moisture content and popping expansion are described.

BOOK REVIEWS

MATHER, K.

519.24:57

Statistical analysis in biology.

Methuen and Co., Ltd., London 1946: 16s. 2nd Ed. Pp. 267. 61 tables. 10 figs.

The first edition of Dr Mather's *Statistical Analysis in Biology* appeared in 1943, and the appearance of a second edition so soon afterwards may be taken as sufficient indication of the very great usefulness of this book, which has in fact become an almost indispensable source of information on statistical methods for biological research workers.

With the exception of very minor alterations in the text, the second edition is the same as the first. An additional chapter has been added, however, on angular and probit transformations. The advantage of including these means of rendering certain sets of data more amenable to mathematical analysis was pointed out in the review of the first edition of this book published in *Plant Breeding Abstracts* (cf. Vol. XIII, p. 272), and will be generally admitted.

It may be possible to disagree with Dr Mather on the mode of presentation of some parts of this book, but the whole forms such a useful guide both to biologists in general and to plant breeders and geneticists in particular, that it may be unreservedly recommended.

5:35

Science and UNESCO.

Pilot Press, London. Pp. 64. (Undated).

The tasks and functions of the Natural Sciences Division of UNESCO are defined and discussed in detail. Part I of the publication deals with the historical development and general principles of international scientific co-operation, outlining the scope and achievements of the International Scientific Unions, and the Science Co-operation Offices organized during the second World War, with particular reference to the British Scientific Office in Chungking, and the U.S. Interdepartmental Committee of Cultural and Scientific Co-operation with the South American Republics. Part II is devoted to the concrete amplification of the 15 main proposals for the activities of the Natural Sciences Division of UNESCO, summarized in Part I.

A bibliography of 65 references on the various problems of international scientific co-operation and a list of abbreviations of relevant organizations are appended.

JUCCI, C.

575.1

Introduzione allo studio della genetica per medici, agrari e naturalisti.
(**Introduction to the study of genetics for physicians, agriculturalists and naturalists**).

Ulrico Hoepli, Milano 1944: Pp. xxiii + 419. 146 figs. 11 pls.

The bearings of this observation lays in the application of it.

Charles Dickens, *Dombey and Son*

Captain Bunsby's remark has been taken, if not as the text, then as the axiom around which Professor Jucci has woven his text-book. Genetics, he states in the preface, must be a weapon with which mankind is to fight for world peace, a weapon less readily convertible to destructive ends than the machine. Italy had already suffered severely from the effects of war by the end of 1943, when this book was completed, and the practical side of reconstruction has, largely for this reason, remained foremost in the mind of the author. He sees in genetics a means by which organisms may be improved by human control, with the consequent promotion of agricultural development on the one hand, and the provision of a firm basis for preventive medicine on the other.

The author suggests that his book might well have been entitled "An introduction to the study of biology on the basis of genetics", and his range of subjects is certainly far from restricted. Indeed, it might perhaps be questioned whether certain sections are relevant to the subject of genetics at all, for instance, that devoted to the biological control of insect pests and weeds (pp. 267-273). The book, which emphasizes throughout the physiological aspect of its subject, is divided into three parts of approximately equal length. The first deals with the theoretical basis of genetical study in quite a narrative style. The second part is devoted to lethal and sterility factors, especially as they occur

in insects, mammals and birds—only fifteen pages in this section are devoted to plants—with numerous photographs illustrating the effects of various congenital deficiencies. The third part deals with the genetical control of viability and of biological adaptation, the author regarding the role of natural selection in evolution from the usual neo-Darwinian angle. The genetics of biological susceptibility, resistance and immunity to parasitism, occupying nearly one hundred pages, is dealt with in some detail, since it provides a fruitful field for the practical application of the science.

A glossary of over three hundred technical terms constitutes a useful appendix, and a bibliography of the more important relevant works concludes the book. There is no comprehensive list of references, however, and the student must seek elsewhere for the original sources of the investigations of Bateson, McClung and others, whose results are quoted in the text. Unfortunately, there is no index.

Three features of this book demand especial note. In the introductory section, an attempt has been made, with some success, to exhibit basic genetical principles as far as possible by means of diagrams alone. Chapter IV, for instance, on the linear arrangement of genes, consists of sixteen pages of diagrams and legend, and only three pages of text. Some of the figures, however, e.g. fig. 7, are not sufficiently bold for clarity, while a few, e.g. plates II and III, are inadequately labelled. A second feature is the emphasis laid upon the genetics of the silkworm and its allies, and of the mosquitoes, insects of primary importance in the economy of Italy. The works of Astauroff, Manunta and of the author himself, during the last decade, are treated in some detail, with colour plates indicating clearly the principles involved. A third feature is the almost complete absence of mathematical analysis, which has become such an important instrument for the study of genetics in recent years. The works of Fisher and Haldane, for example, receive scant mention, while no reference is made to the statistical studies of Sewall Wright.

A few small points of criticism might perhaps be made. In spite of the explanation of chiasmatype crossing-over on p. 58, plate II, modified after White, illustrates the classical theory, now no longer held to be correct by the majority of geneticists; the use of the term "caryocinesis" especially when applied to reduction division as on p. 17, is now best avoided; the statement on p. 5 that "germ cells lose all connexion with the parent organism" may be considered by some a trifle too sweeping; and the inconsistent Italianization of certain Latin names, e.g. *Phytoptora*, *Blefarospora*, *Erisiphe polygoni* and *Coccomyces prunofoae* on pp. 363–70, defeats the object of an international nomenclature, and is to be deprecated. But perhaps the most serious criticism concerns the title; only a fraction of the book is of direct interest to the medical profession, while the genetics of natural varieties and the mechanism of speciation and evolution are only sketchily dealt with.

It is grudging praise to make reference to the difficult conditions under which Professor Jucci must have worked, which explain why several recent developments in genetics have escaped his notice. For this the war is to blame. His book will certainly prove a welcome addition to the educational literature of Italy, while all students will find useful his clear exposition of the comparative principles of genetics. A great deal of information of his book will, in addition, be of especial interest to workers in the field of practical animal genetics.

R. A. L.

ASHTON, T.

575.125:633

The use of heterosis in the production of agricultural and horticultural crops.

Imperial Bureau of Plant Breeding and Genetics, Cambridge 1946:

3s. Pp. 30.

It is only in recent years that plant breeders have begun to realize that homozygous plants may not, after all, necessarily represent the most desirable objective for their labours. The phenomenon of hybrid vigour has of course been known from time immemorial, but it is only since large scale production of hybrid maize got under way in the United States, that the possibilities of utilizing heterosis in other crops began to receive the attention that it deserved.

In Miss Ashton's bulletin, a survey is presented of breeding work undertaken with the express intention of making use of heterosis in the following crops: wheat, oats, rye, maize,

barley, sorghum, rice, forage crops, potato, cotton, hemp, abacá, sugar cane, sugar beet, tobacco, chillies, sunflower, strawberry, grape vine, tomato, egg-plant, carrot, radish, onion, cabbage, various cucurbitaceous plants, leguminous crops and forest trees. In several cases, the utilization of hybrid vigour does not appear to be economically promising; in other cases, as in tomatoes and onions, it has already produced promising results.

The bulletin is confined to a consideration of the practical possibilities of heterosis, and does not go into the many controversial theories which have been put forward to explain why it occurs. The literature quoted is principally American, though there are several references to important investigations by Russian and other workers.

The bibliography includes 234 references.

SCHMALHAUSEN, I. I.

576.12

[**The factors of evolution (the theory of stabilizing selection)**].

Published by Acad. Sci. U.S.S.R., Moscow-Leningrad 1946: 27 roubles.

Pp. 396. 46 figs.

This book is a companion volume to two earlier treatises by the same author: "The living organism as an entity" and "The paths of and the laws governing the process of evolution". In this monograph, special emphasis is laid, as indicated by the sub-title, upon diverse forms of stabilizing selection and the multifarious roles played by them in the process of progressive evolution of living organisms. The material drawn upon is mainly zoological, although frequent references are made in the text to apposite examples from the plant kingdom. Part I [pp. 10-95] is devoted to the phenomena of individual variability as the bases of historical change of all living organisms. It contains mostly data with which both biologists, and, especially, geneticists are quite familiar. Much attention is paid, however, to (a) the changeability of stable and unstable organisms, and (b) the importance of internal and external factors of ontogeny for the bringing into being and persistence of inherited forms and mutations. Part II [pp. 96-221] deals with the dynamics of historical variability of populations. It comprises an analysis of the motive forces responsible for evolution in its initial stages as well as a discussion on the mechanism that brings about the transformation of the genetical make-up of populations. In Part III [pp. 222-343], details are given of the elementary processes of changes occurring in, and affecting, the animal organism in its historical development. Part IV [pp. 344-383] furnishes the relevant data on the *tempo* of evolution and the factors determining its rate of progress. These include consideration of the importance of external factors, of the place of a living organism in "nutritional chains", and of the purposive activity and adaptability of a living organism. The book is undoubtedly a valuable contribution to the modern concepts on the subject.

FISCHER, A.

576.3

Biology of tissue cells.

Cambridge University Press, Cambridge 1946: 31s. 6d. Pp. viii + 348.

55 figs. 15 tables.

Ever since Carrel's announcement of the possibility of maintaining animal tissues in culture in 1910, it has been hoped that the new technique would lead to important advances in our understanding of morphogenesis. To a certain extent this expectation has been realized, though not as fully as some had wished for. On the contrary, a tendency to minimize the importance of tissue cultures has been noticeable in recent years, and it is with these critics in mind that Dr Fischer has brought out the series of essays under review. The author is, of course, a well known investigator in this field, and his account of the progress that has been made, including some of his own unpublished results, should prove of great interest to all workers on tissue cultures, and also to other biologists wishing to ascertain the general theoretical significance of the results of tissue culture studies.

The plan of the essays is as follows. There is an introductory discussion as to what constitutes the fundamental unit of life, the organism, cell or some intra-cellular unit, and this is followed by a series of essays dealing with the morphology of tissue cultures, growth, cell movement and cell division. Sections of rather more general interest follow on regeneration phenomena, and on differentiation and organization and the determining

factors, also on dedifferentiation in culture, and on the problem of the degree to which tissue cultures may be regarded as totipotent.

Death is a biological occurrence very amenable to tissue culture methods, and this is considered together with the factors causing ageing. The three penultimate essays are biochemical in tone, and treat in some detail the effect of nutrients, growth promoting substances and inhibitors on tissue cultures, questions of nitrogen metabolism and the dynamics of tissue metabolism. The last essay reviews the preceding accounts and summarizes the author's general conclusions.

As to the points of general biological interest that emerge from Dr Fischer's account, perhaps one of the most important in his criticism of the cell theory, a form of biological atomism which does not receive much support from tissue culture studies. Indeed, it appears that single cells are unable to perpetuate themselves or grow in culture, there being a definite minimum number of associated cells which alone can exhibit the normal manifestations of life. A useful distinction is drawn between open and closed tissue systems, the former represented by the actively proliferating cells of tissue cultures, where the nutrient supply is unexhausted, and also by the regenerating cells around a wound in whole organisms, the latter being characteristic of intact organisms, and of cultures showing signs of differentiation. The strong negative correlation between growth and cell division on the one hand, and differentiation on the other is emphasized repeatedly.

Several other viewpoints of general interest emerge, but it is difficult to avoid the conclusion that tissue culture methods have not led to as many new conclusions as had been hoped. They do form an excellent means of demonstrating facts already known, and the application of cinematography has enabled them to furnish some of the most elegant representations of mitosis. On the other hand, much of the discussion centring around the data provided by tissue culture experiments has been about terms only, a weakness from which this book is not entirely free.

All investigators of tissue cultures would naturally profit by reading Dr Fischer's account. For biologists in general, however, there is hardly sufficient grist to necessitate their perusing it. A very great improvement in the book could have been made by arranging for an English-speaking reader to revise the highly unidiomatic text.

MERRILL, E. D.

582

Merrilleana. A selection from the general writings.

Chronica Botanica 1946: 10: 127-394. Published by Chronica Botanica Co., Waltham, Mass. (price \$4.00).

Merrilleana is a collection of articles by Dr Merrill, brought together into a single volume by the editors of *Chronica Botanica* as a tribute to the author on the occasion of his seventieth birthday.

A summary of the academic career of Dr Merrill prefaces the volume, followed by a useful bibliography of his published works. The remaining pages are devoted to reprints in whole or in part of twenty-three papers by Dr Merrill, the first of these, *The Ascent of Mount Halcon*, being originally published in 1907, and the latest, *Further Notes on Tobacco in New Guinea*, dating from 1946. All the papers are in English except *Die Pflanzen-geographische Scheidung von Formosa und den Philippinen* which first appeared in Engler's *Botanische Jahrbücher*.

The papers have been chosen so as to display Dr Merrill's very wide botanical and human interests. Naturally, there is a preponderance of papers on pure taxonomy, those devoted to an elucidation of the species and genera established by such early writers as Rheede, Rumphius, Burman, Blanco, Loureiro, Bartram and Rafinesque being of particular value. Other topics include various phytogeographical problems, the usefulness of plant distribution studies in the reconstruction of geological history, in particular the significance of the Wallace line and its analogues, and the mutual relations of plant geography and anthropology, both of which may be of the greatest assistance to the other. In the latter connexion, Dr Merrill appears as a severe critic of extreme diffusionism, and as a strong supporter of the autochthonous development of American agriculture.

A particularly useful contribution of Dr Merrill to taxonomy is his demonstration that the vernacular names of plants may be of great value in the task of interpreting the botanical

descriptions of the older systematic writers, largely because local names in many cases have persisted unchanged for several hundred years unaffected by the vagaries of Latin binomials. As one of the most eminent systematists of America and of the world at large, it is very fitting that a presentation volume to Dr Merrill should have been brought out on this occasion. It might be argued, however, that the many original contributions of Dr Merrill would have been more appropriately recognized by a presentation series of original papers by contemporary writers than by a reprint of his own already available papers.

STANDLEY, P. C. and

STEYERMARK, J. A.

582(72.81)

Flora of Guatemala.

Fieldiana (Botany) 1946: 24: Pt V. Pp. v + 502. (Published by Chicago Natural History Museum, price \$3.50).

It is a pleasure to bring to the notice of readers of *Plant Breeding Abstracts* the publication of Part V of the *Flora of Guatemala*.

This part deals with the Leguminosae, Geraniaceae, Oxalidaceae, Tropaeolaceae, Linaceae, Erythroxylaceae, Zygophyllaceae, Rutaceae, Simaroubaceae, Burseraceae, Meliaceae and Malpighiaceae. As might be expected, by far the greater part of the volume, pp. 1-367, is devoted to the Leguminosae; the other families share the remaining hundred pages. The plan of this part of the flora follows along the lines of the earlier parts. For each species, a conspectus of the synonymy is followed by notes on its ecology, on its distribution within Guatemala and beyond, and on the Indian, Spanish and English vernacular names that are current in Guatemala and the surrounding countries. In a part of the world where the majority of native plants are designated by comparatively fixed vernacular names, the desirability of having these recorded in a flora is obvious.

The taxonomic description of the species follows the introductory notes and is distinguished to advantage by smaller type. The descriptions are lucidly written and do not abound in the obscure terminology favoured in some quarters. Following the technical description, notes are frequently added on the economic uses of the plant, the authors' opinions as to its taxonomic status, and any other points that seem of general interest.

These final notes are especially valuable. It always comes as a slight shock to discover what a very high proportion of the plants of comparatively undeveloped regions are utilized for a multiplicity of purposes by the local people. It is also extremely useful to know whether a species is a "good" one or a "bad" one, and whether it is closely allied to its congeners or not. Such information is all too rare in modern floras, where each species appears as if of equal status to all the others.

The authors have adopted throughout a critical attitude to excessive splitting, and will thereby earn the gratitude of all geneticists who have been exasperated by the arbitrary artifices of the species multipliers. It is clear that the authors' restraint in this matter derives largely from their extensive field experience, and in fact they suggest in one place that excessive splitting tends to result from herbarium studies unsupplemented by contact with living material. This conclusion seems just.

By refusing to indulge in an orgy of splitting, the authors find themselves at frequent variance with the *North American Flora*, and such writers as Britten and Rose, and Rydberg. Here again, those who have been disconcerted by the alarming generic and specific splitting characterizing so many sections of the *North American Flora*, will find themselves sympathizing once more with the authors.

Care has been taken throughout to provide workable keys to the genera and species, and on this matter it is difficult not to approve the authors' dictum that "if species cannot be keyed, it is safe to assume they have no claim to specific rank."

It would be platitudinous to state how great a need this flora is meeting. Few indeed would be prepared to regard its appearance as any less than a major event in the history of American floristics. Its completion will be eagerly awaited.

EDE, R.

63

The principles of agriculture.

Sir Isaac Pitman and Sons, Ltd., London 1945: 15s. Pp. xiii + 272.

23 figs. tables.

The Farm Institute Series, when complete, will consist of six volumes designed to cover

a one year's course in general agriculture at British county farm institutes. This is the first book of the series, and is intended to provide a foundation or framework of principles on which the somewhat more practical information to be supplied by certain of the later volumes may be built.

The first part of the book consists of five chapters dealing with the economic geography of farming in England and Wales; nine chapters on plants and soils make up the second part on crop production; the third deals with animal production and the last is headed "Farming as a Business".

War-time diets have taught the English public a good deal about concentration and dehydration. They have learnt that some subjects are more suitable than others and also that much depends on the process used. This is a useful analogy to have in mind when estimating the task the author has set himself in writing this book. The extent, the complexity, the integration of the original material, and above all, the fact that it is essentially alive and growing, mean that "dehydration" is well nigh impossible; the material suffers too great losses to be made good by normal processes of "reconstitution". What can be done, and Mr Ede has succeeded in doing it, is to provide a concentrated material which in the hands of a good teacher will come to life again.

Plant breeders will note that there is a short chapter on crop improvement and that some of the simplest aspects of Mendelism are touched on in the chapter on animal breeding.

J. L. F.

DUBOS, R. J.

632.3:576.3

The bacterial cell in its relation to problems of virulence, immunity and chemotherapy.

Harvard University Press, Cambridge, Mass., 1946: \$5.00. Pp. xix + 460. 32 figs. 44 tables. 8 pls.

Linnaeus' relegation of all non-flowering plants to the twenty-fourth and final class of his system illustrates an attitude which, to some degree or other, continues to influence the outlook of most botanists. Since flowering plants are, on the whole, bigger and more conspicuous than cryptogams, they have served as the basis for studies on which generalizations have been based covering plant life in general.

Genetics forms no exception to this tendency. Mendel based his classical researches on a flowering plant, and his inferences from his discoveries have since become the genetical norm. Much can of course be said in favour of this procedure, but it is now becoming apparent that the lower plants do not always accommodate themselves comfortably under the classical neo-Darwinian genetical system developed from Mendelian principles. The principal difficulty concerns variation, and the multiplicity of terms applied to this phenomenon in the lower plants, mutation, variation, saltation, dauermodification, dissociation and such like, indicates a corresponding uncertainty as to its nature.

Professor Dubos has gone into this problem in as far as it affects the bacteria, and has, in a book concerned with many other aspects of bacteriology of lesser interest to geneticists, assembled a body of information of fundamental importance to genetical theory. The first four chapters of his account deal respectively with the technique of bacteriological procedure, cytology, with illustrations provided by electron micrographs, the physical and biochemical properties of bacteria, with an excursus on the Gram stain, and a description of the enzymology and immunological properties of bacteria.

It is in the fifth chapter on *The Variability of Bacteria* that matter of special interest to geneticists is presented. The account given is somewhat brief and the author does not attempt to grapple with the conflicting interpretations of the recorded observations, yet his collation of the relevant literature should prove extremely useful to geneticists unfamiliar with bacteriological literature. Professor Dubos deals firstly with variations with age of culture, then with transitory modifications induced by the environment, next with the somewhat more complex reversible formation of adaptive enzymes, and finally with more or less permanent hereditary variations. He is unable to admit that satisfactory evidence has been provided for the existence of sexuality in the bacteria, though the possibility necessarily haunts the minds of those trying to explain bacterial dissociation, and were it proved, would radically transform notions on this subject. The account given

on pp. 184-87 of the transmutation of pneumococcal types is especially interesting, since this affords one of the best authenticated cases of an hereditary change induced directionally by experimental means.

Chapters VI to VIII deal with virulence, immunization and bacteriostatic and bacteriocidal agents, and, being on medical topics, contain fewer points of general interest to geneticists. In the final chapter, the author returns to general considerations, and discusses the divergence in outlook that has tended to separate bacteriologists from other biologists. There is also an interesting account of biochemical and immunological specificities of the bacteria, which the author attributes, not to the bacterial cell as a whole, but to its molecular or sub-molecular components.

A fitting addendum to this excellently written book is provided by Dr Robinow, who contributes a luminous account of bacterial nuclei and bacterial cell division. Eight plates accompany this exposition, and by themselves constitute an admirable summary of the accompanying text. It is now becoming generally known that bacterial nuclei are more than vague suppositions; it is perhaps less well known that the rod-shaped cells of many bacteria are typically divided by transverse septa.

CICIN, N. V. and
MARINIČ, P. E. (EDITORS)
(**Varieties of field crops**).

633(47)

Sel'hozgiz, Moscow 1944: 12 roubles. Pp. 344. 158 figs.

This useful reference book was published under the auspices of the Ministry of Agriculture of the U.S.S.R. by the State Commission for Varietal Tests. The volume is the work of 20 experts. Over 400 varieties are described, some of which have already been introduced or reported to be promising for general cultivation, while others are described for the first time. The following crops are dealt with: winter rye, winter wheat and barley, spring wheat and barley, oats, maize, millet, buckwheat, sorghum, rice, *Lathyrus* spp., vetches, clover, lucerne, sunflower, peas, *Phaseolus*, soya bean, lentil, and *Cicer arietinum*. Numerous line drawings in the text illustrate the morphological characteristics of many of the varieties, and an alphabetical list of the varieties is appended. In the preparation of the book, extensive use has been made of the data provided by the network of state testing stations for the period 1938-42. The value of the book is further enhanced by the statistical data giving the total average of each particular crop, its relative importance in comparison with the total grain production, and also the average yields of each variety under commercial and experimental conditions.

H. F.

BALDACCI, E.

633-2-1.521.6

La resistenza delle piante alle malattie. (**The disease resistance of plants**).

Società Anonima Editrice Dante Alighieri, Genova-Roma-Napoli-Città di Castello 1942: Pp. 261. 14 figs.

In the first part of this treatise, the author examines three hypotheses of disease resistance, viz. those involving chemotropic stimuli, acidity of the cell sap, and plant antibodies, respectively, but dismisses them all as untenable. The conclusion is reached that the mechanism of resistance differs according to the type of both host and parasite, and the various types of resistance mechanisms are examined in the second part: both mechanical and chemical factors giving rise to resistance are considered, and extensive reference is made to the literature on the subject; nuclear reactions are discussed, and also special cases such as mycorrhiza and nodule formation.

In the third part, the factors modifying resistance are discussed. The genetics of resistance or the breeding of resistant varieties are not treated.

DUNIN-BARKOVSKIĬ, V. N.

633.512(47)

[**Wild kendyrj (*Apocynum sibiricum* P.), its utilization and preservation**].

Vserossiiskoe Obščestvo Ohrany Prirody (All-Russian Society for the Preservation of Nature) Moscow 1941: 6 roubles. Pp. 176.

Mention is made of the two species, *A. sibiricum* and *A. venetum* L.; *A. turkestanicum* is believed to be only a botanical variety of the former species, with which the present

book is mainly concerned. *A. sibiricum* is a perennial plant propagating itself by means of rhizomes and seeds. Every spring it sends up stems which, under the conditions peculiar to the verges of certain rivers in Central Asia, where the best specimens are to be found, yield fibre, rubber and tanning material; the stems are also the source of many other manufactured products. Attempts to cultivate it have not yet been successful, but study of the botanical characters of the plant, and of the natural environments most favourable to the development of properties desirable in manufacture, has enabled the author to recommend measures which can improve existing production, and perhaps make possible the cultivation of the crop in the great variety of soils and climates to which its hardiness and vigour makes it adaptable.

There is no reference to the breeding and genetics of *A. sibiricum*; it is not known for certain whether the species is self-pollinating or cross-pollinating. It exhibits morphological variations under the influence of the environment; certain populations are recognized by their ability to accumulate large quantities of starch in the root system. This ability explains the fact that the numerous tall straight stems are produced by certain populations only. Dense planting may produce tall stems, but only with short fibres, and it causes progressive weakening of the plants.

Unfortunately the lettering and explanatory labelling of the diagrams and graphs are too small to be readily legible, and the photographs are of a poor standard. I. Z.

WILDEMAN, E. DE

633.73

Etudes sur le genre *Coffea* L. Classification, caractères morphologiques, biologiques et chimiques, sélection et normalisation. (**Studies on the genus *Coffea* L. Classification, morphological, biological and chemical characters, selection and standardization**).

Palais des Académies, Bruxelles 1941: 201.50 francs. Pp. vi + 495.

104 figs. 7 pls, tables.

The taxonomic intricacy and the great economic importance of the genus *Coffea* have occasioned the publication of such a large number of papers that the appearance of a comprehensive review of the principal lines of research dealing with plants of this genus is greatly to be welcomed, the more so as the author is well known for his own researches in this field.

The opening section of the book goes over quickly the history of the various intrageneric classifications put forward to subdivide the genus *Coffea*. Special attention is paid to the systematic arrangement elaborated by Professor Chevalier. The author is particularly interested in the taxonomic status of the species he deals with, discussing this in the light of the Linnaean and Jordanian species concepts.

A detailed discussion of natural variation within the genus and of the various plant characters concerned follows. Parallel variations in several distinct species are noted, and Vavilov's views on this matter are mentioned. Detailed consideration is then given to the types of variation illustrated by the root system, by the branch system, and by the morphology, variation and anatomy of the leaf. An interesting account follows of the systematic importance of the modifications associated with the presence of insects. Sections are devoted respectively to domatia, myrmecophily and galls.

The frequency of interspecific and intraspecific hybridization within the genus is noted in the next chapter, together with a discussion of its significance for taxonomy. Continuing his discussion of natural variation, the author then turns to such characters as chromosome number, flowering biology and pollination, the development of the ovule, and the various characteristics of the fruit.

A large portion of the book, pp. 197–267, is devoted to minute descriptions of the beans of selected coffee varieties. For each type, details are given of the proportion of normal beans to peaberries, the length, breadth and thickness of the beans, and the percentage of beans with two furrows. The accompanying illustrations portray a series of transverse sections of typical beans for each variety.

Up to this point, the author has dealt mainly with morphological characters. In the later chapters, he turns to physiological and biochemical traits. Of special interest are his accounts of the percentage germination of the beans, and of the caffeine and mineral content

of the various varieties. Consideration is also given to the correlation between the biochemical constitution of the beans and their taste and aroma. The effect of the environment on the morphology of coffee plants is studied, with special emphasis on the effects of water balance, light, heat and wind.

Plant breeders will be particularly interested in Chapter V of the book which deals with selection methods, selection criteria, hybridization, and standardization of coffee crops. They will also find useful the annotated list of binomials included under the genus *Coffea* constituting Chapter VI. References to detailed accounts of each of the forms listed are included, and plates are given of *C. arabica*, *C. canephora* var. *kouilouensis*, *C. congensis* var. *Chalotii*, *C. Dybowskii*, *C. Klainei*, *C. liberica* and *C. stenophylla*.

At the conclusion of this very useful review, a list of approximately two hundred and fifty references is given.

STANKOV, S. S.

633.85(47)

(Wild oil plants of the U.S.S.R. and their practical utilization).

Sel'hozgiz 1944: 1.5 roubles. Pp. 78.

This useful booklet is published under the auspices of the Committee of Plant Resources of the All-Union Council of Scientific Engineering and Technical Societies, for whom N. V. Cicin is the general editor. The plants are described under three main categories: (a) those that are the source of drying oils; (b) those that furnish semi-drying oils; and (c) those that yield non-drying oils. Under each category details are given, with their Latin names, of species of trees, shrubs, and plants belonging to the Linaceae, Labiatae, Cruciferae, Compositae and some other families. In addition, information is provided on the chemical and technological quality of oils obtained from 156 different plants, as well as notes on industrial uses of such soils. There is also a very useful list of common Russian names of plants described in the text.

H. F.

FERRAND.

633.912:575:578.08

Phytotechnie de l'*Hevea brasiliensis*. **(The phyto-technique of *H. brasiliensis*).**

Librairie Agricole de la Maison Rustique, Paris 1944: Pp. 435. 67 figs. tables.

Designed to give to the agronomist and the practical planter essential, up to date information and a bibliography of the most important publications, this monograph covers the main aspects of the botany, selection, improvement, cultivation and development of *H. brasiliensis*. Great progress has been made in rubber production by means of selection in the chief centres of rubber production, the Dutch East Indies, Ceylon, Malaya, Indochina and the Belgian Congo, but it is noted that all the material available has been derived originally from a few plants from Brazilian seed. It is argued that, could the vast untapped resources of Brazil be explored, invaluable discoveries might be made. The section devoted to selection deals with variability in production as related to the characters which determine production. The practice of selection includes the choice of mother trees, and is followed by descriptions of breeding methods involving vegetative propagation, especially grafting. Crossing is used to create new material for selection, and the technique of rearing the seedlings is described.

Beside the possibilities of obtaining new material from Brazil, a study of the physiological properties of individual plants and their relation of these to latex production and other characters is suggested for future research.

R. M. I.

CHEVALIER, A. and

LEROY, J.

634

Les fruits coloniaux. **(Fruits from the colonies).**

Presses Universitaires de France, Paris 1946: Pp. 126.

In this handy volume, No. 237 of the series "Que sais-je?" published by the Presses Universitaires de France, the claims of the fruits of the French colonial empire are stressed. Even before the war, in France, the consumption of tropical and sub-tropical fruit was far behind that of the United States and England. The authors describe the main edible foreign fruits, noting briefly their history, distribution, cultivation and nutritive value. They suggest that a special department should be set up to promote the development of colonial fruits for home consumption.

R. M. I.

MILLER, C. D. and

BAZORE, K.

634(96.9)

Fruits of Hawaii. Description, nutritive value, and use.

Bull. Univ. Hawaii Agric. Exp. Sta. 1945: No. 96: Pp. 129. 21 figs.

This publication is a revised and enlarged edition of Bulletin 77 of the Hawaii Agriculture Experiment Station, "Some Fruits of Hawaii", which was first published in 1936 and is now out of print. It gives simple, useful notes on the general characteristics, the history, nutritive value and uses of the avocado, banana, breadfruit and 36 other fruits grown in Hawaii. Attractive recipes are given for the varied use of each fruit. Appendixes on fruit preservation and the vitamin and mineral contents of the Hawaiian fruits are also included.

NEW JOURNALS.***Agrobiologija*.**

The well-known Soviet journal *Jarovizacija* [Vernalization] has apparently now been replaced by a new publication bearing the name *Agrobiologija* [Agrobiology]. In other respects the journal seems to remain largely unchanged being almost or entirely devoted to contributions by T. D. Lysenko or his collaborators (cf. *Plant Breeding Abstracts*, Vol. XVI, p. 365). The first number, which appeared in 1946, starts with an article by Lysenko entitled "Soviet Darwinism" and contains also a contribution by I. I. Prezent entitled "Lability and Stability of Properties of Plant Organisms in Connexion with their Mode of Reproduction." Other articles deal with hybrids between apple and pear, supplementary artificial pollination in rye, directed variation in wheat hybrids, shattered inheritance, formation of characters in interspecific cherry hybrids by grafting, overcoming inbreeding depression, genetical differences in quality in tissues in the potato, and naturally coloured lints in cotton.

All these articles are reviewed in the present number of *Plant Breeding Abstracts*.

***Journal of the British Grassland Society*.**

The first two numbers of the *Journal of the British Grassland Society* have been received. The British Grassland Society was founded in 1945, with the main purpose of encouraging investigations on all aspects of grassland husbandry, and of stimulating practical use of knowledge gained by research and experimental work. The first number of the journal of the society contains the presidential address delivered by Sir R. George Stapledon, who reviews the problems of grassland production in Britain to-day and promising lines of enquiry. The articles in the second number on "Ryegrass Strains Indigenous to South-western England" by F. R. Horne, and "Breeding in Relation to Grassland Husbandry" by T. J. Jenkin, are also of particular interest to the forage plant breeder.

Enquiries should be addressed to the Secretary, Dr R. O. Whyte, British Grassland Society, Agricultural Research Building, Penglais, Aberystwyth, Wales. Subscription to Volume 1, Nos 1 and 2, is ten shillings. The journal is supplied free of charge to members of the Society.

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